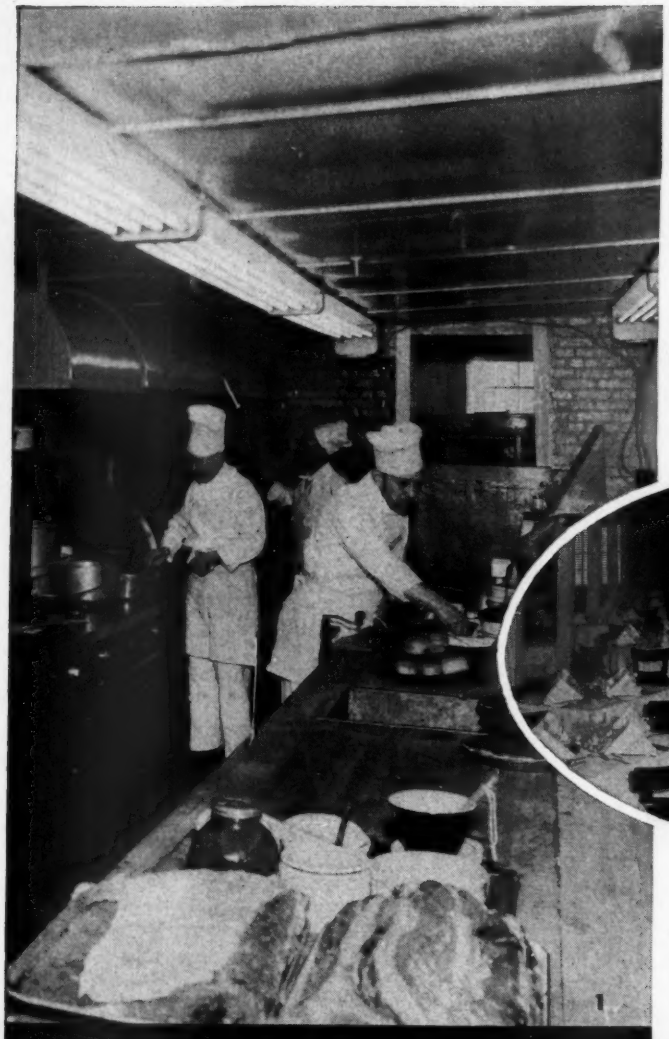
AMERICAN GAS

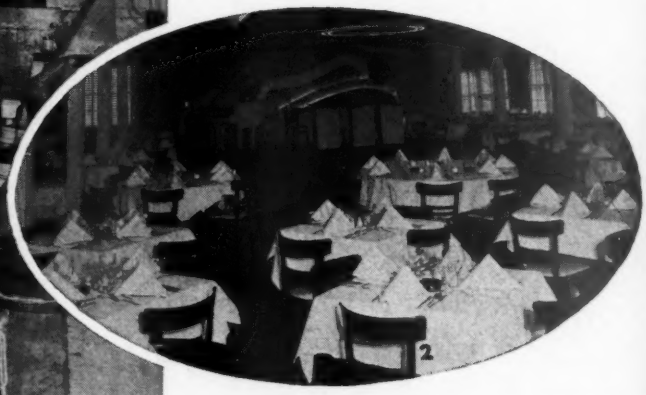
Association

MONTHLY

MARCH 1945 • VOL. 27 · NO. 3



Owner of Deluxe Restaurant calls Gas "Indispensable"



Mr. Martin L. Horn, owner of the beautiful and exclusive Mayfair Farms restaurant in West Orange, New Jersey, in discussing his kitchen equipment with a Commercial Representative of his Gas company said, "We consider the use of Gas fuel indispensable. We are proud of the uniform excellence of our cuisine and service and we believe the use of Gas fuel plays a vital part in maintaining our high standards."

Serving Dinner and Supper six days a week to an average of 2,000 patrons weekly, Mr. Horn finds Gas most economical, especially in keeping spoilage of expensive foods to a minimum. Automatic, flexible temperature control of Gas equipment enables the staff to produce foods of constantly excellent appearance and tastiness, with a minimum of supervision.

Consult your local Gas company's representative about your cooking and baking problems. He will show you how Gas and Gas equipment can help you do a more profitable job.

1. The efficient, spotless kitchen of Mayfair Farms

2. The beautiful dining room

3. Exterior of Mayfair Farms

AMERICAN GAS ASSOCIATION
INDUSTRIAL AND COMMERCIAL GAS SECTION
420 LEXINGTON AVENUE, NEW YORK 17, N.Y.

THE TREND IS TO GAS

FOR ALL
COMMERCIAL COOKING

One of the current advertisements in the National Industrial and Commercial Gas Company

The war has brought greater realization of the potentialities of gas, not only as a fuel but as a chemical raw material. One of the most authoritative accounts of the vast possibilities inherent in natural gas is contained in the leading article in this issue. It shows conclusively that there is no limit, other than supply, to the manifold uses of this gift of nature. . . . As direct and compelling as a good window display is George Browne's exposition of the fundamentals of showmanship at the point of sale. Helpful in war, good display is virtually indispensable in peace. . . . Continuing on the road to better range design, the A. G. A. Laboratories make another substantial contribution. This time it is a study of insulation to provide cooler cooking tops. . . . The use of radio to speed communications in utility systems is relatively new and undeveloped. Mr. Humphreys' gives impetus to the interest in this modern medium. . . . With imagination and resourcefulness, prewar Russia set up several full-scale experiments in underground gasification of coal. What they learned and how it applies elsewhere are ably told by Dr. Wilkins in a well-documented Review.

EDITORIAL OFFICES:
AMERICAN GAS ASSOCIATION
420 LEXINGTON AVE., NEW YORK 17, N. Y.

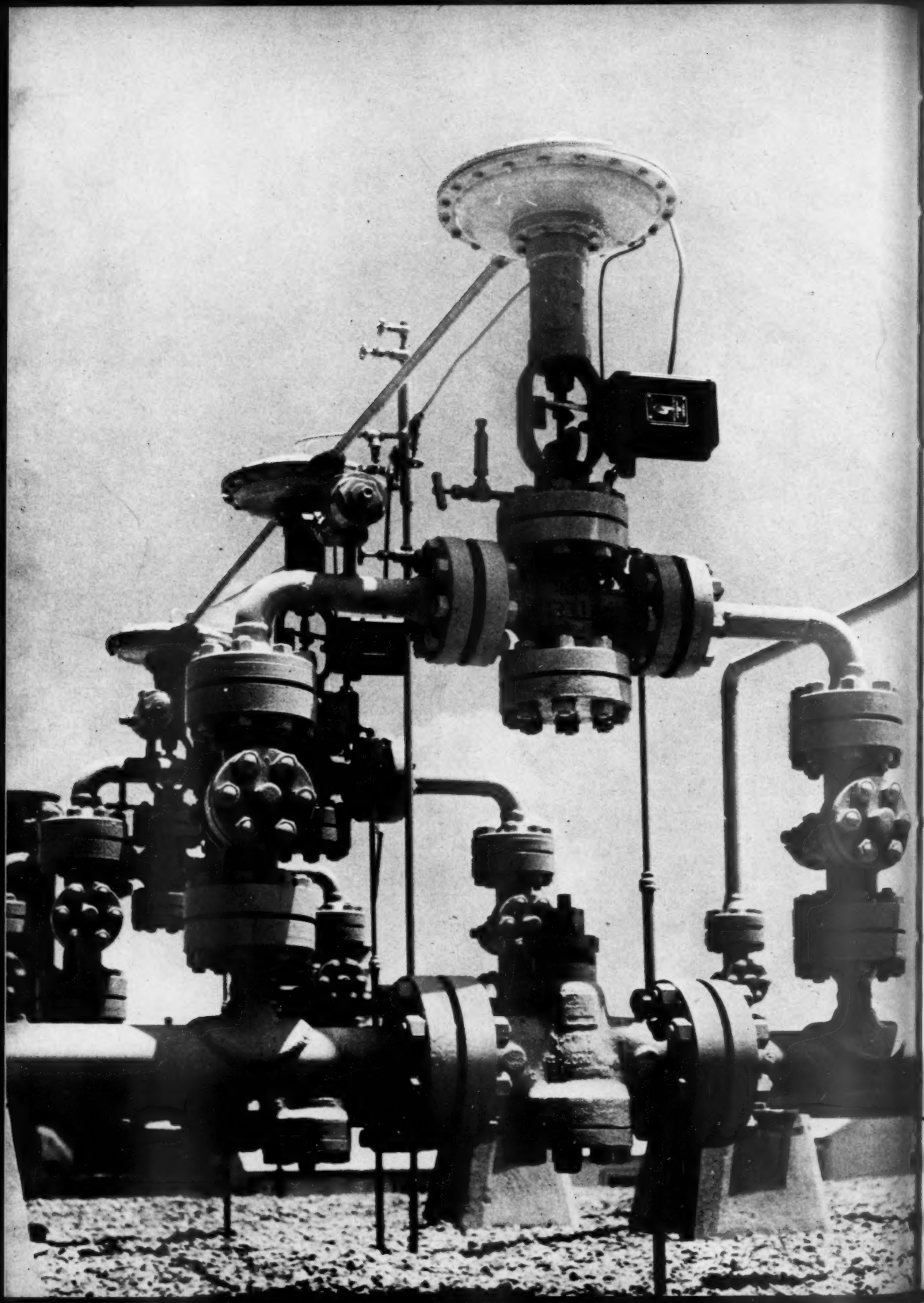
CONTENTS FOR MARCH 1945

FEATURES

SECTIONS

DEPARTMENTS

• Subscription $3.00 a year - Published eleven times a year by the American Gas Association, Inc. Publication Office, American Building, Brattleboro, Vt. Publication is monthly except July and August which is a bi-monthly issue. Address all communications to American Building, Brattleboro, Vermont, or to 420 Lexington Ave., New York 17, N. Y. All manuscript copy for publication should be sent to the editorial offices in New York. The Association does not hold itself responsible for statements and opinions contained in papers and discussions appearing herein. Entered as Second Class Matter at the Post Office at Brattleboro, Vermont, Feb. 10th, 1922, under the Act of March 3, 1879. Cable addresses: American Gas Association, "Amerigas, New York"; American Gas Association Testing Laboratories, "Amerigaslab, Cleveland."



JAMES M. BEALL, *Editor*

Science in Natural Gas

BY JAMES E. PEW
Director,
and
FRANK H. DOTTERWEICH
Technical Consultant
Natural Gas and Natural Gasoline Division, Petroleum Administration for War

THE rise of our petroleum technologists to meet the present war demands for aviation fuel, synthetic rubber and explosives and other war products has sent them into all the scientific fields. No longer are they content with materials that will do the job well, but they constantly strive to improve the apparently perfect product, even duplicating in a period of minutes changes that nature required millions of years to bring about.

Man in his quest for liquid gold, once he had begun to get petroleum out of the earth, found that in many instances natural gas came ahead of it at terrific pressure. This was treated as a nuisance or hindrance, or at best as a thing of uncertain and local economic value. Although the value of natural gas as a fuel was always recognized, long before the advent of modern natural gas practices and even at the present time, enormous volumes have been blown to the air, burned and lost.

Today finds not only modern technologic procedures allowing for the development and perfection of means of discovery, production, transportation and storage of our natural gaseous hydrocarbons, but also the magic hand of science is now converting this increasingly valuable natural resource into newer and super forms of energy and into varied chemical ingredients from which may be derived amazing products—products that will allow us to be victorious and to continue in our way of life with better health and greater happiness.

Thus, natural gas, once looked upon with scorn, avoided and intentionally wasted, now takes its place beside its twin, petroleum, in comparative value. In this paper, the authors will endeavor to direct major attention to science in natural gas; what has been accomplished during the present emergency, together with what may come about in the period to follow.

The scientist of the petroleum industry seems to be the forgotten man in the current public discussion on how long our petroleum reserves will be sufficient to meet the increasing demands for fuel and other useful products before we must turn to substitute sources. While such discussions are in progress, the petroleum technologist is writing his name in the scientific hall of fame by bringing about many advances in refining technique, chief of which is the production of enormous quantities of aviation fuel.

To power our long range bombers and fighter planes, super fuels high in octane value must be produced. These fuels must be capable of developing maximum power at full throttle to better enable heavily laden planes to take off and to climb and fight as conditions of war dictate—this property, termed "rich mixture rating," must be accompanied by a suitable "lean mixture rating" to enable the power unit to operate efficiently when cruising to and from the target or battle area. Thus, into one fuel is blended ingredients to insure the power and efficiency, prerequisites in all phases of modern aerial warfare. To effect this, the liquid fuel to power our planes consists of a definite blend of base stock, iso-octane alkylate, isopentane, tetraethyl lead, ethylene dibromide, together with additives of more recent perfection, like cumene, 2.3 dimethyl butane and others that cannot be reported due to restrictions.

It is true that the greater proportion of this fuel finds its origin in petroleum; however, it is equally true that the natural gasolene fluids produced from the natural gas, oil, and condensate fields of the nation contain a far greater proportion of the key or critical components than are found in an equiva-

Presented before the Texas Academy of Science, Galveston, Texas.

● Opposite: Wizard-controlled regulators, together with valve positioners, reducing pressure to dehydration plant of Oklahoma Natural Gas Company. Photographed by Ruth Canaday, most frequent winner in the MONTHLY frontispiece contest.

lent volume of crude oil. These accomplishments are only made possible by the scientist's ability to reduce, rearrange and combine the molecules of petroleum and natural gas into definite geometric molecular patterns. In ever striving to perfect newer and better aviation fuel, it appears that the gas chemists find their syntheses from concentrated light hydrocarbon fractions of ever increasing importance and with unlimited possibilities. Thus natural gas, although not the bulk raw material of our present and future aviation fuels, continues as one of the major sources for the production of super quality ingredients.

Production of Synthetic Rubber

Rubber, quickly and in large quantities, was and is a wartime "must." Every trick and process known to science has and is being tried to make more and better synthetic rubber. The amazing accomplishments in the development and production of our new synthetic rubber, however, cannot reflect truly the terrific pace the rubber chemist has set to bring this about. To produce butadiene, one of the most important ingredients of synthetic rubber, approximately one hundred actual and theoretical methods exist for its synthesis, while a dozen or more known methods are being practically employed for its production. Products extracted from natural gas are not the major raw material in the production of butadiene, being employed in only 13% of the present authorized rated plant capacity. However, in the production of other rubber "musts," like styrene and fillers such as carbon black, natural gas plays an important role, especially in the latter.

Today's synthetic rubbers, wherever they find their origin, in common with the liquid latex from natural rubber, are dependent for their toughness, and resistance to wear, in addition to their tensile strength, upon a submicroscopic derivative of natural gas—carbon black. Natural rubber and synthetic rubber have unusually low tensile strength in the pure state. To produce the desired strength and wearing properties, the scientist has developed carbon black to the point where the tensile strength of synthetic rubber is increased by 600 per cent.

Whereas natural rubber required one type of black, paint another and ink another, synthetic rubber requires yet another. With the development of satisfactory carbon blacks for the compounding of synthetic rubber, a new problem, or bottleneck, was encountered, that of compounding the black with the rubber. Thus, if the production of synthetic rubber was yesterday's problem, its processing is today's. Once again the scientist has made available new processes whereby carbon black slurry is added to the liquid rubber, permitting a finished rubber with perfect distribution—a natural blend rather than mechanical.

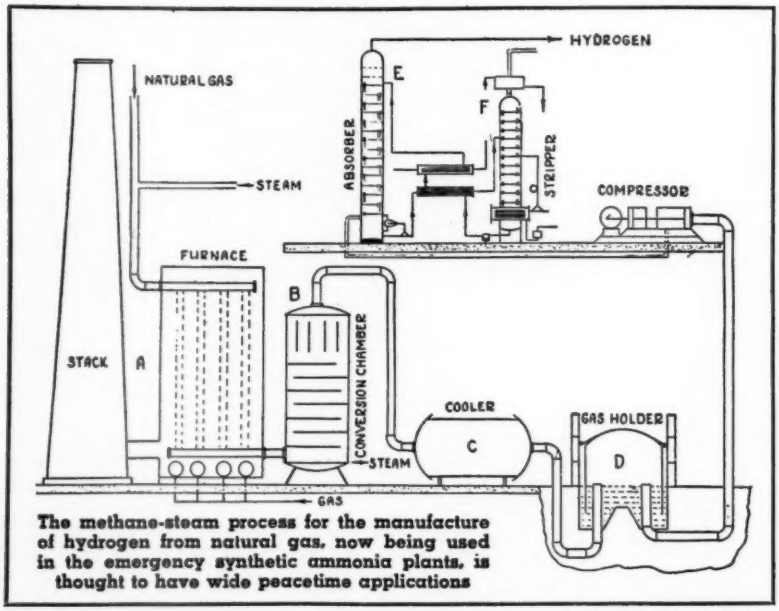
This achievement, together with a reported new continuous polymerization process, has the possibility of the greater use of synthetic rubber even after natural rubber is available, because these new processes reduce the cost of synthetics in addition to producing a better product. These developments are continuous, with one of the latest and most outstanding being that of including a carbon chain, thus producing electrically conductive rubber. Thus the dreaded ice formation upon airplane wings may be better eliminated by electrically heated rubber covering. Also, electrical conductive products may allow for the dissipation of electric charge heretofore suspected as the cause of unaccounted-for accidents. Again it appears that predictions, frequently voiced in the past, to the effect that synthetic rubber products or synthetic natural rubber blends would produce superior products at a lower cost than those manufactured exclusively with natural rubber, each day draw closer to reality.

Gas for Explosives

The use of natural gas as a raw material in highly efficient processes requiring a minimum of new critical construction materials has made possible the production of the immense quantities of explosives required for the war. The significance of ammonia in the production of explosives is well-known. Our modern block busters find formaldehyde, ammonia, together with nitric acid, indispensable for the production of one of its major ingredients—hexogen. The production of these materials from natural gas has thrust the latter to the fore in the present emergency.

Probing more closely into these accomplishments, it may be noted that this, to a great degree, has been made possible by the development of a process in which natural gas and steam react to produce hydrogen or a mixture of carbon monoxide and hydrogen with amazing overall yields.

This process by which natural gas and steam react to form carbon monoxide and hydrogen is equally important in supplying raw materials for the production of peacetime products as it is prod-



The methane-steam process for the manufacture of hydrogen from natural gas, now being used in the emergency synthetic ammonia plants, is thought to have wide peacetime applications

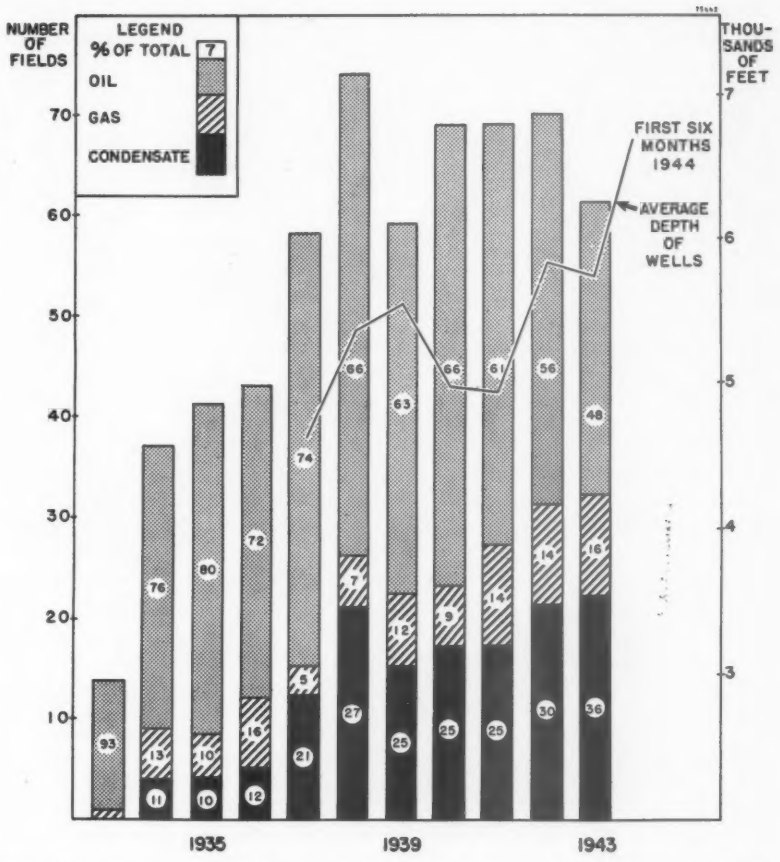
National Petroleum News

ucts of destruction. As will be shown herein this may be a major source of raw materials required for the production of plastics and synthetic fuels.

At the present time, there is much discussion relating to the use of the aforementioned process, together with the Synthine (Fisher-Tropsch) Process, the combination of which allows for the production of liquid fuels from natural gas. Naturally, the perfection of such a combination of processes to produce liquid hydrocarbon fractions on a favorable economic basis could result in an enormous quantity of natural gas being used, thereby depleting our natural gas reserves. This seems improbable, although the operation of pilot plants indicates a favorable economic conversion, with plans for at least one commercial plant underway.

Synthine Process

It appears that the Synthine Process using natural gas as a raw material may be used to produce select hydrocarbon fractions, performing a duty similar to that of our propane and butane fractions in the preparation of key components for aviation fuel—the bulk of our petroleum fractions continuing to come from our crude oil supply. One of these select hydrocarbon fractions increases the cetane number of diesel fuel and gives promise of remarkable improvements to the present fuel supply for many diesel-powered ships in the fleet.



New fields discovered in South Arkansas, Louisiana and the Coastal plain of Texas, showing the increase in importance of the condensate fields in recent years. (Chart prepared by PAW)

Synthetic plastics are fast becoming wartime substitutes for critical materials, while some of them are among the critical materials themselves because of superior qualities for certain specialized uses. In his development of plastics, the scientist has opened new fields in which they exhibit unique properties. Some are like glass, others rubber, some resist corrosive chemicals of all types, still others exceed the resistance to vibration and fatigue failure that conventionally used metals exhibit.

In this paper it is impossible to discuss exhaustively the properties and uses of all plastics for they appear to exist in endless numbers. However, a few of the more outstanding, which proven processes may produce from natural gas as the major source material, will be set forth.

The gas chemist has used an invisible thread to produce the Acrylic resins presently marketed under the trade names of Lucite and Plexiglas. This nonshatterable plastic, approaching invisibility through transparency, assures maximum visibility and security to our pilots, bombardiers, and gunners, is but one of the wartime wonders of the scientist. Additional properties like superior transmission of light over glass, the piping of so-called cold light, the ability to transmit the germ killing ultra violet light, should find it extensively used to insure brighter, healthier homes of tomorrow.

As the scientists' knowledge of the larger molecule progressed, it was soon evident that the preparation of purely synthetic fibers and filaments was possible. Thus, the perfection and production of Nylon, Vinyon and Saran followed each other in rapid succession.

The use of Nylon needs no comment. This superior form of fabric, presently going directly into the war effort, finds natural gas playing only an indirect role in its synthesis; however, Vinyon and Saran may be produced from the derivatives of natural gas under favorable economic conditions.

Vinyon, like Nylon, possesses high tensile strength, is odorless, tasteless, does not support combustion, and is permanently water-resistant and mildewproof. Naturally, it too plays an important role in the war. Recently perfected processes suggest it will be made available in ever increasing amounts through the use of hydrocarbon gases as raw material.

Saran, another filament, is remarkably beautiful in appearance, strong, durable, tough, flexible, abrasive resistant and immune to soaps. Saran should find widespread use for many applications like draperies, upholstering, etc., in addition to its outstanding application in the form of non-corrosive, non-heat conducting window screening.

As in the above, scientific progress

insures the production of many valuable finishing agents, solvents, plasticizers, detergents and synthetic lubricants. Just to what extent natural gas will serve as a major raw material cannot be determined at present, but processes previously referred to suggest that it may be a source raw material in the production of the important ethenoid and formaldehyde resins.

In order that scientific accomplishments may be beneficial to mankind, they must be of proven practical use—produced on a desirable economic basis. Thus, the contribution of natural gas in such proceedings resolves itself into a quantitative study. A greater portion of the dry natural gas, chiefly methane, presently being converted into chemicals, finds its major end product explosives, thus the results of such a study are restricted.

It has been pointed out that although dry natural gas is of importance as a chemical raw material, especially in the production of hydrogen, water gas and ammonia, present trends suggest that the heavier fractions, like ethane, propane, and butane, are more desirable for chemical processing.

A recent study of the production and disposition of LP-Gas products by a Special LP-Gas Industry Subcommittee included their use for the production of chemicals in the United States exclusive of the West Coast. This study* together with the estimated use on the West Coast indicates that a total of 389,127,500 gallons of propane, butanes, and butylenes, separately and as mixtures, were used as a chemical raw material in 1943. The 1944 requirement, with the latter nine months estimated, was set at 478,022,000 gallons, an increase of 23%. These requirements do not include butane for synthetic rubber and for isomerized isobutane for aviation fuel, these having increased 260% and 270% respectively for the same period.

There is presently going on stream or in the progress of construction a new type of commercial plants which will produce oxy-hydrocarbon chemicals and unsaturates like acetylene and ethylene. The former process, Catalytic Oxidation, employs preferably propane and butane as the raw material with the latter process, Regenerative Cracking, using ethane-propane mixtures. These recently perfected processes insure the production, in large quantities, of many of the useful products, previously mentioned, under favorable economic conditions with the ingredients of natural gas being used almost exclusively as the raw material.

Deep Drilling

The search for crude oil has resulted in drilling to greater depths with increased discoveries of the so-called gas condensate reservoir. These deep production operations are made possible by a scientific-engineering combination insuring efficient geo-chemical and geo-physical exploratory methods, together with effective drilling and production procedures.

In the so-called gas condensate reservoir, nature has failed to conform with the classic chemical laws and to cope with this unusual situation, it was necessary for scientific discovery to be practically applied over a relatively short period of time, so that the loss of underground valuable hydrocarbon fractions would be held to a minimum. It is significant to note that it was the engineers of the Texas Railroad Commission who were among the first to recognize this phenomena and who endeavored to control the production in such reservoirs to hold underground waste to a minimum. Representatives of this Commission now actively continue their constructive work in the field and it is interesting to note that more progressive state regulatory bodies are now cognizant of these problems and are taking steps to insure the underground conservation of our select hydrocarbon fractions.

The Petroleum and Natural Gas Division of the Bureau of Mines has turned virtually all its studies in the direction of supplying information needed by the Petroleum Administration for War and by the petroleum industry in conducting the war program. Two of the least publicized tasks entrusted to this Division of the Bureau have been the study of condensate fields and their products and the program of supplying the large quantities of helium required in the total war effort.

Study of Condensate Fields

The study on condensate fields and their products includes a complete analysis of the stabilized flow stream of both the gas and liquid under separator pressure and temperature, together with an estimate of reserves of condensate and probable recovery factors, supplemented with geological and engineering data. In securing all the essential data required to evaluate the productivity of condensate fields in accordance with the war effort, portable laboratory units, equipped with the most modern scientific equipment, have been designed, built and are now in operation.† The results of these precise investigations have been invaluable in the development of a program to supply the light hydrocarbon requirements of the war. However, due to the confidential nature of the information secured from the companies operating in the areas studied, these reports cannot be published in their entirety, but it is hoped that a general technical study will be available after the war.

Of all the ingredients found in certain natural gas streams, possibly none are of greater importance and value in war or peacetime than helium, one of the so-called "noble" gases. Because of its chemical inertness, helium will not burn or ex- *(Continued on page 148)*

* The data reported herein are taken from the preliminary report of a special LP-Gas Industry Committee and are subject to revision.

† See "Portable Equipment for Measuring Properties of Fluids from Gas-Condensate Wells" Kenneth Eilerts, "A. G. A. Monthly," April, 1944.

Diesel Fuel

● A diesel engine development making possible the alternate use of a wide variety of fuels, without any auxiliary sparking device, was to be announced last month by Cooper-Bessemer Co. of Mount Vernon, Ohio, it was reported in *Business Week*.

Details on the departure from conventional diesel design are withheld, but the resultant engine is said to run on fuel oil, natural gas, manufactured or coke-oven gas, sewage gas, or refinery by-products, with almost equal ease. Engines that embody the new principle are in production.

Ralph O. Boyer, chief engineer of the company, claims that the development permits a fuel saving, in diesel-gas engines, of 20% to 25%; that thermal efficiency is the same regardless of the fuel used, and that its wide adoption would prevent temporary gas shortages from curtailing production.

The manufacturer expects the new fuel alternator to be most useful in areas where gas is the normal fuel, and where fuel oil could be used for standby. Conversion from one fuel to another would be a matter of closing one valve and opening another, even while the engine is running at full load.

Essentials of Good Display

Effective showmanship plus proper technique make window and store displays one of industry's most important and adaptable media for sales promotion tomorrow

ADVERTISING is a vital part of our free enterprise system, not only as a means of establishing and maintaining markets but as a mighty force for social good. The history of the American business structure has proved that business needs the essential stimulus that good advertising supplies. It informs prospective customers of what business has to sell, informs them of what the product will do for them, and through this information, creates a desire for the advertised product or service.

This desire, which is stimulated by local newspaper and national magazine advertising, must be kept alive through the use of other media. Therefore, if it is rekindled at the point of sale through attractive window displays prospects will be more likely to enter the store for additional information. This is the way that display or point-of-sale advertising brings the customer into the store and becomes the silent salesman that closes the sale.

Displays Have Competition

Your display windows are in direct competition with other stores, amusement places, theaters and all brightly lighted places that are striving to attract the shoppers' attention and tap their pay checks. Therefore, it's good showmanship for utility display men to use light, color and animation, to add to the effectiveness of their creations.

BY GEORGE W. BROWNE

Public Service Electric and Gas Co., Newark, N. J.; Chairman, A. G. A. Window and Store Display Committee

Postwar merchandise displays must be carefully planned and cleverly executed if you expect to influence Mr. and Mrs. Consumer to have the many advantages offered by modern gas appliances as compared with the 194X competitive goods. The average shopper visits 15 to 20 stores weekly and buys only about 40 of the approximately 75,000 items that are displayed for purchase. So, only well-displayed merchandise can successfully compete for their attention, time and money.

Most Valuable Space

It is important that your display windows express dignity, cleanliness and progressiveness. Their appearance indicates to the passerby the character of your company or store.

The chief job of window display is to reach right out into the sidewalk traffic and stop people, interest them, transfer the interest from the display to the product. Then, cause the observer to see and appreciate the value, use or benefits that would be theirs if they owned the displayed appliance. And last and most important it should bring the prospect right into the store.

The question of whether windows should have open or closed backs has been the subject of much discussion. The proponents of the open-back window argue that the advantage of letting day-

Feature one appliance in each group so that the customer has a place to start looking

Your display windows are in direct competition with other windows, amusement places, etc.

light into the store and the ability of shoppers to see through the back of the window and view the merchandise inside overrules any of its disadvantages.

Open back windows lose more than 50% of their effectiveness because the prospective customers' attention is diverted from the featured appliance to the merchandise they can see in the back of the store. Also, too frequently there is activity on the part of the stores' personnel that adds to this distraction.

Solid backgrounds prevent window frosting and make displays easier to prepare. They are easier to keep clean and merchandise displayed receives the full benefit of overhead lighting. They are more attractive and less expensive to trim. Appliances can be shown in their correct setting and receive the complete attention of window shoppers. It would seem advisable to follow the practice of leading department stores in their use of closed back windows. After all, they are the outstanding merchandisers of the country.

Display windows can be divided into two classifications. First, the automobile accessory type of store whose main appeal is price. They use their windows to catalogue their merchandise and their success depends on the sale of a large number of low-priced articles. The second classification consists of the so-called specialty group. Their displays are designed to give the impression of dignity and reliability. Their main appeal is service. Utility windows belong in this second group.

So simplify your displays. Let each window tell only one story at a time. Feature one article or group of related articles. Even when it has been decided to give an impression of a large stock by a mass display of appliances, each window should contain a group of closely related appliances. This kind of design attracts attention. Don't forget that you can sell one person only one idea at a time.

Plan displays weeks in advance. Give plenty of thought to display copy. Change your windows often, at least once a week. Tie-in with newspaper, billboard and other advertising.

The appearance of your display windows indicates to the passerby, the character of your company

Dramatize Your Displays

Dramatize your displays. Sell the benefits and conveniences of your gas servants . . . . not the metal and paint that the appliances are made of. Remember women don't buy cosmetics; they buy the softer, smoother skin that will result from their use. Men don't buy insulation; they buy the comfort and fuel savings that are features of insulated homes. So don't sell gas as a fuel . . . . sell the magic flame that will make the home easier to manage and more pleasant to live in.

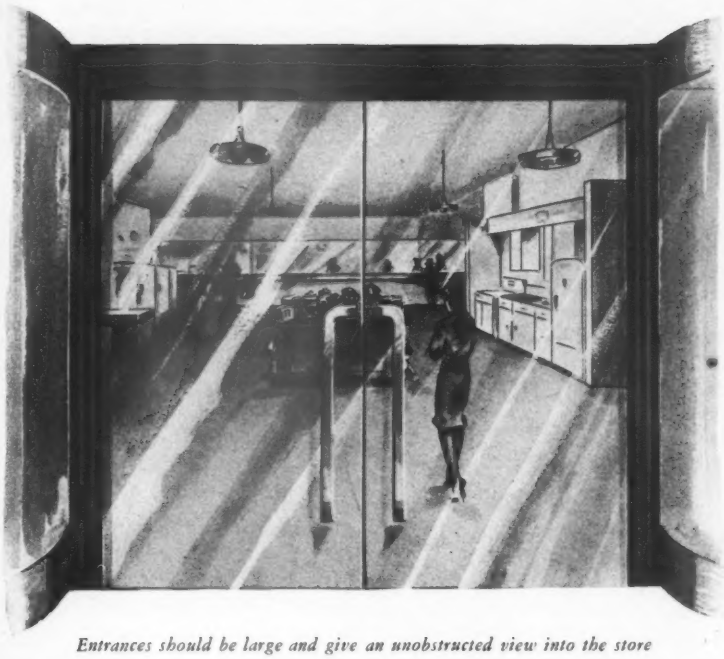
Window displays have two big advantages over all other forms of advertising in doing this job. They can use the appliances themselves for illustration. Their readers are right in front of the store and while their desires are strong can step into the store and make their purchase.

One of the most valuable ways that a utility window can be used is to aid the promotion of patriotic, civic and charitable activities. Cooperation with these organizations will signify to your public that your company is a worthy citizen of the community.

Make Entrance Inviting

After customers have seen a window display and their desires have been created their next impulse is to enter the store.

What is the best type of doorway to use? It should be large and give an unobstructed view into the store. The doors should swing easily in and out so that bundle-loaded customers do not have to



Entrances should be large and give an unobstructed view into the store

wait for each other, or fumble with a door handle.

Do away with steps. One of the greatest discoveries in retailing was that a step only a few inches high would turn away trade. So replace any present step with an inclined ramp. Make it easy for your customers to enter your sales floor—don't turn them away.

Banish "Bottle-Necks"

Aisles should be planned so that floor traffic will flow freely past as many departments as possible. People will follow the widest aisle first. So place service and wrapping counters and cashier's cages in the rear of sales floor or along the narrowest aisles. This will route customers past display tables and appliances that are off the main traffic lane.

Plan each department so that it will stop traffic. Feature an appliance in each group so the customer has a place to start looking. Add other appliances of the same or related types to the group so that the customer can make comparisons. Customers must compare in order to choose and buy.

Do away with dead spots or "bottlenecks" where customers turn around and leave. It costs your company money to get them into the store—see if you can't have them spend their money before they leave.

Make Goods Accessible

"Accessible Merchandise" is the most dynamic new idea in retailing. It allows the customers to go right up to the merchandise and handle it. This gives them a feeling of ownership which is a long step toward the completion of the sale.

Descriptive signs containing full information including prices are necessary for this type of merchandising.

Get rid of the old-fashioned high counters and enclosed cases. They guard against theft, but they guard against buying as well.

Buying is stimulated when the merchandise is accessible. Shoppers leave the store with more goods than they expected to buy when they came in.

Light and Color

Customers are more likely to buy goods in and return to a store that is correctly lighted. Consult a lighting engineer. He will show you how to highlight displays and increase the attractiveness of the floor arrangements.

Good design is the "Skeleton" of a display, color is the "Flesh and Blood." Good design satisfies the eye; Color harmony appeals to the senses.

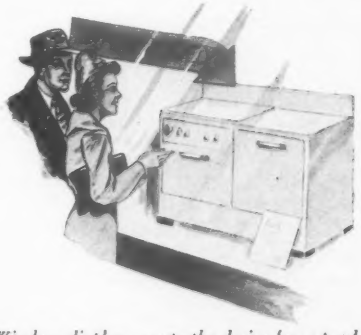
Most major appliances are white and therefore will have highest visibility against a blue background. Red could be your second choice and then green.

Somber and dark colors are depressing—bright and warm colors are exciting—pale and cool colors are restful—Choose your colors for the effect you want to create. They can impress your public either favorably or unfavorably. So use color with care.

Summary

Display technique has justified itself throughout the years by the amount of sales it created. It can be traced as far back as biblical days when man displayed his goods for barter in the market place. From this period up to today display has improved and developed into one of the most important and adaptable media of the sales promotion profession, if properly executed.

It has been said, that of the total sales completed 75% can be credited to display and other forms of advertising. With this thought in mind it is *essential* that *all displays* be *good displays.*



Window displays create the desire for a product at the very door of the shop where the decision to buy is easily acted upon

House of "Cards"

● Undergoing the impartial test of weather at Appleton, Wisc., is a trim little cottage—made of paper. This experimental emergency house consists of 21 prefabricated panels of waterproofed paperboard, 49 lbs. of glue, metal fasteners and wooden frames for its clear plastic windows. Assembled in 59 minutes, these few materials add up to a neat 16 x 8-ft. cabin which costs only $51.20, plus labor. Sponsoring its test is the War Production Board's Office of Production Research and Development.

Cooler Gas Range Cooking Tops

A. G. A. research points way to practical methods of reducing surface temperatures of ranges, other appliances

BY R. M. CONNER

Director, American Gas Association Testing Laboratories

R. M. Conner

ALTHOUGH the subject covered by this paper has been treated largely from the standpoint of its relation to gas range construction, the general theories advanced apply equally well to practically all types of gas burning equipment. Consequently, the information which follows should prove of value not only to gas range manufacturers, but to all who are interested in the construction and performance of domestic gas burning appliances.

Laboratories Bulletins Nos. 7 and 33 indicate the effectiveness of various types of materials for insulating gas range ovens and broilers and contain many valuable suggestions for reducing surface temperatures of such sections. They summarize, in fact, the greater part of present day knowledge on such subjects, particularly insofar as it relates to methods of reducing excessive heat losses from gas ranges.

It seems hardly necessary to state that excessive heat radiated or otherwise liberated from oven and broiler surfaces of cooking appliances has from the beginning represented one of our most troublesome service problems. Fortunately from a competitive standpoint, however, this characteristic has not been confined solely to gas ranges. As a matter of fact, it has been even more pronounced in the case of similar types of appliances consuming other fuels. Be this as it may, however, everyone in our business is not only interested in effecting substantial increases in operating efficiency by the reduction of excessive heat losses, but what is even more important, providing equipment that can be utilized even more conveniently and comfortably than heretofore by our customers.

Radiation and convection losses from all types of equipment burning gas in confined spaces can be reduced by:

1. Use of satisfactory insulating materials, properly applied
2. Proper selection of materials of construction
3. Reduction of leakage of flue gases from openings other than flues
4. Elimination of metal to metal contacts

Insulating Materials

The greatest possibilities for reducing heat losses from exterior surfaces of gas ranges lie in the judicious selection and application of insulating materials to such surfaces. Such materials may consist of mineral, glass, or rock wool, or other types of siliceous compounds, cork, or even dead air space. Because the use of such insulating mediums has become quite well established as a result of years of experience, it does not seem advisable to spend any great amount of time considering this phase of the subject. It should be mentioned in passing, however, that findings outlined in great detail in Bulletin No. 7 prove quite conclusively that there are practical limits beyond which one should not go in the application of even the best forms of insulation.

While thicknesses of insulation in excess of 2 to 2½ inches (the practical maximum) will reduce oven heat maintenance rates slightly, on the other hand, they may increase necessary preheating requirements somewhat, to say nothing of adding to the construction costs of the range. Table 1 from Bulletin No. 33 which follows provides essential data on the most commonly used forms of insulation. Fig. 1 also provides further interesting and confirming information on the fact that beyond 2½ or 3 inches insulating materials are rather ineffective.

Experimental findings reported in Bulletins Nos. 7 and 33 also prove quite conclusively that the density to which ground and fibrous materials are packed has a considerable bearing on their effectiveness. While it is common practice, not only in gas range construction but water heaters as well, to pack insulation to the point which will prevent settling during handling and shipping, minimum densities necessary to prevent settling of three common types of insulating material for various heights of insulating columns are set forth in Table 2.

Range Construction Factors

A study of Table 1, which admittedly does not cover all types of insulation will indicate that there is considerable difference in insulating qualities even between the most common types of insulating materials employed. Certainly the greatest asset of most of the kinds shown is the ease with which they can be applied. On the other hand, one of their very undesirable characteristics is their tendency to settle which must be properly anticipated when the range is undergoing construction. Extremely high spot temperatures, which incidentally represent one of the most common criticisms of present day types of gas range construction, can, in fact, generally be attributed to settling.

Unless it is quite clearly defined, Item No. 2 entitled "Proper Selection of Materials of Construction" may prove somewhat ambiguous. After all, the choice of materials from which gas range ovens and broilers can be constructed is rather limited. Consequently, outside of the use of highly reflective materials for oven linings, door frames and panels, we find no place for exercise of any appreciable amount of latitude. This feature, therefore, is mentioned principally for the purpose of encouraging new thought. If, for example, some form of plastic material were found that would satisfactorily resist temperatures of the order of 800 degrees and possessed sufficient rigidity for use

Prepared for presentation at Technical Conference on Domestic Gas Research, Cleveland.

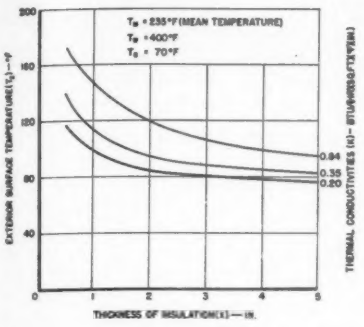


Figure 1—Theoretical effect of thermal conductivity of insulation on surface temperature

in oven and broiler door frames, one of the most troublesome sources of undesirable heat transfer would be eliminated The same general theory could also be applied to many other portions of gas range construction.

Although the use of various types of gaskets for reducing flue gas leakage around oven and broiler doors proved rather ineffective during our experimental work, the idea definitely seems to possess merit. It is obvious that if the travel of hot gases can be materially retarded or deflected elsewhere than through openings around oven doors, thus preventing oven door handles and frames from becoming the hottest portions of the gas range which may be touched by the operator, real progress will be made. Accordingly, any constructional feature that can be incorporated either in the door or its frame that will retard, or better yet eliminate leakage entirely, would be a step in the right direction.

A tongue and groove door joint design, reinforced frames to prevent excessive warping, stronger and more effective door springs, and even the use of durable gasket materials seem indicated despite the lack of generally satisfactory results of research on the latter item. Incidentally, unsatisfactory findings on gaskets seem more attributable to consideration of an insufficient range of materials rather than any lack of logic of the idea. Finally reduction of excessive gas range ambient temperatures calls very definitely for the elimination of leakage around oven and broiler doors. Any design or constructional feature, therefore, that will accomplish this objective should reduce oven and broiler door surface temperatures by at least 25 per cent.

It is believed that the greatest possibilities for reducing excessive oven and broiler surface temperatures lie in the elimination of metal to metal contact. Any engineer understands that all metals are very good heat conductors when contrasted with various types of insulating materials now commonly employed. It is obvious, therefore, that if a temperature as low as 400 F. is carried inside an oven, a substantial amount of heat absorbed by its linings will be conducted to outside surfaces wherever metal to metal contact exists, irrespective of the type or amount of insulation between inner and outer walls.

If it were possible to effectively float the inner walls of an oven or broiler in insulating material, this from the standpoint of reducing excessive exterior temperatures would represent the optimum in construction. Such a design, however, is not feasible from a practical standpoint; consequently, the next best thing seems to be to approach this type of construction as closely as is practically possible. Admittedly, metal to metal contact can be reduced to a much greater extent than is generally the case in gas range construction today. Accordingly, every reasonable effort should be directed to this end. In addition, materials low in thermal conductivity should be employed to the fullest possible extent in joining inner and outer sections together.

Even though general use of materials of low thermal conductivity for the purposes indicated were not practical, a great deal of progress could be made by eliminating unnecessary metal to metal contacts and attaching inner and outer sections with bolts of a material of the lowest attainable heat conductivity.

Final development of the 100 per cent primary air burner should simplify appliance manufacturers' problems of the nature indicated to a very great extent. If, for example, it were unnecessary to provide for admission of second-

TABLE 1

THERMAL CONDUCTIVITY OF VARIOUS TYPES OF INSULATING MATERIALS

Type of Material	*Description*	*Density Lbs./Cu.Ft.*	*Conductivity B.t.u./Hr./Sq.Ft./° F./In.*
Glass Wool (loose)	Glass fibers 0.0003 in. to 0.0006 in. diameter	1.5—3	0.27
Granular	Made from combined silicate of lime and alumina	4—6	0.24
Granular	Expanded vermiculite, partical size—3 plus 14	5—8	0.32
Mineral Wool (loose)*	All forms, typical	10—12	0.27
Rock Wool (loose)	Fibrous material made from rocks	20	0.30
Rock Wool (loose)	Fibrous material made from rocks	18	0.29
Rock Wool (loose)	Fibrous material made from rocks	14	0.28
Rock Wool (loose)	Fibrous material made from rocks	10	0.27
Asbestos Board	Corrugated asbestos board	(4 plies per in.)	0.53
	Corrugated asbestos board	(8 plies per in.)	0.37
Asbestos Board	Pressed asbestos mill board	60	0.84
Air Space	Aluminum foil, 7 air spaces per 2.5 in.	0.2	0.30
Silica Aerogel	Opacified (see note)	8.5	0.15

NOTE: Conductivity values are for mean insulation temperatures of 70 to 100 F. for the various materials.

* Loose wools are also supplied in blanket form.

TABLE 2

MINIMUM DENSITY OF INSULATION NECESSARY TO PREVENT SETTLING IN DIFFERENT HEIGHTS OF VERTICAL INSULATING COLUMN

Type of Material	*Height of Insulating Column—In.* 15	20	25	30	35
	Lb./Cu.Ft.				
Mineral or Rock Wool (Long Fibre)	8.5	9.0	10.0	10.5	11.0
Mineral or Rock Wool (Med. Fibre Length)	8.0	8.0	8.5	8.5	9.0
Glass Wool	2.5-3.0	2.5-3.0	2.5-3.0	2.5-3.0	2.5-3.0

ary air, a major simplification of construction could be accomplished. Even without such developments, however, marked progress can still be made and this statement applies with equal force to gas water heaters as well as to other types of domestic gas burning equipment.

It is somewhat difficult to appreciate the significance of the various items mentioned heretofore unless they are considered collectively. In one instance for example, during our research it was found that by sealing an oven door to minimize flue gas leakage, elimination of metal to metal contact between inner and outer door panels and the addition of a highly reflective surface to the inner side of the oven door brought about a total decrease in the average surface temperature of the door edge from 187 F. to 110 F. or a decrease in temperature rise from 117 F. to 40 F. In other words, these constructional changes although minor and inexpensive in nature, actually reduced surface temperature rise by about 66 per cent. In another case, simply by sealing the door and eliminating metal contact the average temperature rise on the door frame was decreased roughly 58 per cent.

Fortunately none of the suggested improvements in gas range construction are extremely difficult or expensive. In this respect we have an advantage over some of our competitors. That these changes will be made sooner or later there is no doubt. Some of them, it is gratifying to state, have already been incorporated in contemporary designs; what is needed, however, is general acceptance of new and more progressive ideas.

While it certainly should be obvious, it seems important enough to repeat that if we can accomplish worthwhile reductions in heat losses brought about by excessive gas range or other gas appliances surface temperatures, we will be making a real contribution to gas service. Accomplishments of this nature will not only assist by improving our competitive position, but what is far more important in this modern day and age, enhance the comfort and convenience with which gas service can be utilized.

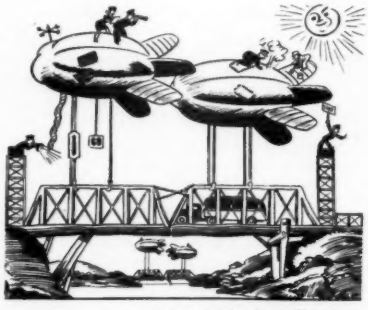
Keeping the Barrage Balloons Up

THE gas industry has received many tributes for its work in the war effort but probably none more heartfelt nor more deserved than that paid the British gas industry by the Air Ministry for its part in keeping the barrage balloons up. In articles and editorials, the London *Gas World* for Dec. 9 and Dec. 16 records this strange war phenomenon, and the following information is from that source:

In the early days of the war, and perhaps in particular during the German air bombardment of London and other towns in 1940-41, it must often have seemed to those who suffered the shower of missiles hurled upon them that barrage balloons were not very much use. It is true that they prevented the German airmen from cruising at roof-top height to drop their bombs, but as they dropped them anyway, there did not appear to be any outstanding advantage in this. The Air Ministry, however, had no doubt of the value of the balloons and kept them flying.

Every merchant ship carried its balloon to prevent low-level attacks, and there is no doubt that for that purpose the balloon was highly effective. But the balloon barrage really came into its own when the flying bomb attacks were launched. It is now common knowledge that while the airplane and the gun were the first line of defense and brought down the bulk of these missiles, the last line of defense was a vast balloon barrage in which nearly 2000 balloons were used. This curtain ended the career of many a bomb, and though it did not prevent some from getting through, it certainly saved the citizens of London from great suffering and considerable casualties.

The life-blood of the balloon barrage is hydrogen. The amount of hydrogen required was very large. There was heavy wastage due to the natural properties of the gas, its velocity of diffusion being very high on account of its low density. This wastage had to be made good; fresh supplies of hydrogen had to be found. Here the gas industry stepped into the breach. In 1940, hydrogen production at the gas works began to get going and 7.3% of the country's requirements were furnished. Thereafter the proportions supplied by the gas industry grew steadily: 41.3% in 1941; 59% in 1942; 67% in 1943 and approximately 75% in 1944.



National Petroleum News

Ike Doodleschmaltz submits his idea for postwar use of barrage balloons. In sending this to the Fruehauf Trailer Co., Ike explained that it was "the answer to the problem of weak bridge spans on our main national highways."

It is clear that upon the gas industry was placed the onus of keeping the balloons flying. That task was accomplished; the gas industry never let London down; it did not let any part of the country down. In Air Commodore Lincoln's words: "At no time during the 'curtain' operation did the hydrogen supplies break down; 'Hydrogen was always there,' but it was only made possible by the tremendous zeal shown by all concerned, especially the employees of the gas works from which supplies were drawn."

It is also a matter for congratulations that the work of organizing this gigantic production was done by gas engineers; that the development of the necessary plant was the work of two firms well known as manufacturers and designers of gas plants; and that the operation of the first large-scale plant, on which the others were based, was done by engineers and chemists of the gas industry. During this initial period they were subject to bombing, they had to work throughout the blackest of black-out conditions, and they were working on a plant hardly completed, with empty cylinders waiting to be filled.

The process adopted is an interesting one and the complete technical story of its development has yet to be told. The hydrogen is produced at the gas works by the steam-iron process, using water gas and steam which are normally available. The water gas is passed over a heated chamber containing a special iron ore, which is reduced to iron. Steam is then passed through the ore and is in turn reduced to hydrogen. These operations continue alternately and the hydrogen is collected, purified and compressed into cylinders.

Cold in Britain

THE British government appealed to the public January 29 to reduce the consumption of gas and electricity used at record rate in Britain's coldest winter in a hundred years—in order to avoid restrictions on war industries. Many householders had been waiting weeks for coal orders of as little as 100 pounds.

Easy Does It

THE New York *Sunday News*, with the largest newspaper circulation in the world, on Dec. 24 showed a full page of pictures of Teaneck, N. J., High School girls who are learning carpentry. One caption says:

"They were afraid of the machines at first but soon found woodworking as easy as cooking with gas."

Birmingham Gas Uses Radio

Among other advantages, speed of radio communication has prevented some loss of life and serious damage from major leaks

BY T. G. HUMPHREYS

Chief Radio Engineer, Birmingham Gas Co., Birmingham, Ala.

T. G. Humphreys

FOR many years the Federal Communications Commission which licenses and controls all radios in the United States has allocated a small group of frequencies to "special emergency" service. Public utilities are eligible for this service.

One of the rules of the Commission provides that "special emergency stations may be used only in case of an emergency jeopardizing life, public safety, or for the protection of important property." It is probable that because of this rule, utilities have not made full use of the frequencies available to them. Undoubtedly, they have felt that the need to defend their use of such radio communication facilities, as well as the limitations placed on its use, made it impossible to justify either the first cost of the facility or the cost of its operation.

After considerable study and investigation, the Birmingham Gas Company made application for a permit to construct and operate such an emergency radio system. It was felt at the time that world conditions might involve this country in such a way as to considerably multiply emergencies with which the company would have to cope, and that no reasonable price was too high to pay for any means which would allow it to most fully discharge its responsibilities to its customers and the community.

In the summer of 1940, the Federal Communications Commission granted a permit to the company allowing the construction of an emergency radio system to be composed of one 250-watt and one 20-watt fixed transmitter stations, and 25 two-way mobile stations.

The fixed transmitter stations were installed at points several miles apart: the 250-watt station at the distribution shop from which point orders are issued by the man in charge of the mobile units, and the 20-watt station at the principal distribution pumping station. The mobile transmitters and receivers are installed in automobile equipment used by the construction and service departments. Under normal working conditions this automobile equipment is disbursed over the entire metropolitan district which is served with gas.

The construction and testing of the radio system was completed in November, 1941, and was ready to be placed in operation on December 1, 1941, except for the fact that it had not been possible to secure permits for many of the men who would use the mobile equipment. These permits were required if the system was to operate as originally planned; namely, with only one radio engineer in charge.

On the day following the attack on Pearl Harbor, it was decided to correct this deficiency by having the 250-watt fixed station continuously under the control and operation of a first-class radio engineer. Until a second first-class radio engineer was employed, the use of the system had to be confined to the time that one operator could be on duty.

Between the date of the initial operation of the radio system and now, enough of the employees who use the system have secured permits from the Federal Communications Commission to allow the system to be operated as originally planned. There is now one first-class radio engineer responsible for the maintenance and operation of the system, and about 42 men holding permits who are allowed under this control to operate either the fixed or mobile units.

There have been many instances which seem to justify the decision to add this radio equipment to the company's other facilities. While there is no absolute proof of what might have happened had slower communications only been available, it is felt that the speed of radio communication may have prevented serious damage from some major leaks, and it is probable that promptness in handling an asphyxiation case saved the life of a mother and baby.

In the early spring of 1943, a serious break in the feeder line to Bessemer, a city of about 25,000, completely deprived the city of gas. Within minutes of the time the break was discovered, mobilization of all manpower of the company had begun and was completed

Dispatcher J. R. Stubbs operating at Birmingham Gas Company's central radio station

Reprinted from *S.G.A. Progress*, November, 1944.

Chief Engineer T. G. Humphreys adjusting main transmitter at the service office

Two-way radio equipment installed in the back of seats in coupes

hours before it would have been had radio not been available.

The work of handling the emergency was further facilitated by the presence of mobile units throughout the area affected, and by the use of one mobile unit to keep the directing head constantly informed of conditions all over the area, making it possible to issue such orders as were necessitated by the developing situation. It is probable that in this case radio communication not only reduced the hazard, but made it possible to restore service hours, or perhaps days, earlier than could have been done otherwise.

While it is probable that no offsetting dollar savings can be clearly demonstrated to justify the cost of this equipment and its operation by the Birmingham Gas Company, it is felt that after 2½ years of experience there is no reason to regret the decision made in 1940 when application was made to be permitted to build and operate the system.

Bureau of Mines War Role Described

THE vital war role of the Bureau of Mines in helping American industry to turn out the all-time record of eight and one-half billion dollars worth of mineral products last year was described in that bureau's annual report to the Secretary of the Interior Harold L. Ickes, released Feb. 20. The bureau's chief contribution to that record, said Director R. R. Sayers in his report, took the form of uncovering millions of tons of critical and essential ore reserves, working out new methods of utilizing domestic ores and improving known metallurgical processes.

At the same time, the report stated, other skilled workers of the Bureau produced millions of cubic feet of helium gas, tested military and industrial explosives, helped develop better aviation fuel, continued long-range coal and petroleum research, advanced safety and efficiency in mineral industries, and performed many other jobs to speed the prosecution of the war.

With military requirements dipping deeply into the Nation's petroleum reserves and hastening the day when other sources of motor fuels and lubricants possibly would be needed, the Bureau completed preliminary plans for an extensive research program on the production of synthetic liquid fuels from coal, oil shale, and other materials. Perhaps foreshadowing a great new postwar industry, the program called for the construction and operation of laboratories and demonstration plants to develop the technical "know how" of synthetic fuels, which ultimately may be needed to preserve motorized transportation and assure adequate national defense for future generations of Americans.

Three new helium plants were completed and put into operation, increasing the total to five and enabling the Bureau again to meet all requirements of the armed forces and for the first time to provide considerable quantities for commercial and scientific uses. The Army and Navy "E" was awarded to the Amarillo and Exell, Texas, plants for their remarkable production records.

Operating under wartime stress, the Bureau's petroleum and natural gas research workers drew many special assignments on primary extraction of petroleum, secondary recovery, and refining problems to aid producers and refiners in meeting production schedules for fuels and lubricants for war machines, toluene for explosives, and materials for synthetic rubber. Sources of base stock and high-octane components for blending into aviation gasoline were determined.

Postwar Air Conditioning Discussed

WINDOWLESS homes or houses that use windows purely for decorative effect were seen as a possibility for the home of tomorrow by John K. Knighton, sales manager of the Air Conditioning Division of Servel Inc., Evansville, Ind., at a recent meeting of the Minneapolis chapter of the American Society of Heating and Ventilating Engineers.

"But this will be a by-product, not one of the major improvements that complete year 'round air conditioning will offer in the future American Home," Mr. Knighton said. "In the fields of comfort and health the advantages of 12-month climate control will be many and varied."

In his talk Mr. Knighton also pointed out much of the history of air conditioning.

The meeting was the regular session of the Minneapolis ASHVE, but was also attended by many architects, builders, and heating and air conditioning dealers. More than 200 were in attendance for the dinner which was given by the Minneapolis Gas Light Co., and the meeting which was held in their auditorium.

Mr. Knighton in discussing the historical background of year 'round comfort control pointed out that the name, air conditioning, was first suggested by Stuart W. Kramer in a book, "Useful Information for Cotton Manufacturers," written in 1909.

Mr. Kramer, however, wasn't one of the first people by any means to investigate indoor climate control. In 1896 the British Parliament appointed a commission to investigate it.

"Mr. Kramer wasn't the first to investigate the possibilities," Mr. Knighton said, "but he was one of the first to outline the job at which we have been striving, and the job we have completed with the Servel All-Year Gas Air Conditioner. At that time he said the job of air conditioning should perform six things—heating, air moistening, ventilating, air cleaning, air cooling, and automatic regulating of humidity and temperature to a pre-determined standard."

John K. Knighton (left above), sales manager, Air Conditioning Division of Servel Inc., talking with E. J. Boyer of the Minneapolis Gas Light Co. at a recent meeting of the ASHVE

Selling Commercial Cooking Equipment

Steps necessary for a coordinated selling effort by gas company, manufacturer and dealer—a triple-threat program that is vital to meet severe competition

BY F. A. KAISER

Assistant to the President, Detroit-Michigan Stove Co.

F. A. Kaiser

IN the past year considerable interest has been aroused in the commercial cooking load by the gas utilities and in commercial cooking appliances by the manufacturers. It certainly is right that there should be this new interest in this portion of our business, when we realize that the commercial cooking load represents approximately 15 per cent of the entire gas load of the country. In view of what we believe the competitive situation will be after the war, it is imperative that the entire gas industry give serious consideration to this load in the postwar period.

Poor Selling Job

For years this particular segment of the utility business has been taken largely for granted. There has been no great sales effort put behind it, and the business was obtained merely because gas, as a fuel, still has a very distinct appeal to the users in the commercial cooking field. However, now there looms upon the horizon, a new competitor whose entire appeal is based upon modernity and whose objective is to prove gas an obsolete rather than a modern fuel.

So it becomes the problem of the gas utility and the gas appliance manufacturer to keep the restaurant and hotel owners convinced that gas is the best and most modern fuel they can use, and that no other fuel will give them the efficiencies, economies and general satisfaction which gas does. Looking at it in that light, the biggest problem confronting us, is the problem of selling.

A number of committees of the American Gas Association have done yeoman service in making recommendations as to improvements in the appliances themselves. Surveys have been taken to indicate the market, and the results of the work of these committees have been excellent from the standpoint of calling attention to the need for an intensive selling program.

Survey of Restaurant Men

Recently, our company completed a survey of restaurant owners in Detroit and 94 per cent of those interviewed stated that they were never talked to about gas cooking equipment by anyone. Likewise, 70 per cent said in answer to the question, "How do you go about buying a new range?", that they would shop around the various equipment houses to select what they wanted. The answers to these two questions certainly indicate that the selling effort behind gas-fired cooking equipment has been extremely feeble and in most cases, nonexistent.

In response to another question asked of those owners now using gas equipment, 95 per cent answered that they would buy gas equipment when they purchased again. However, we should accept even this answer with some qualification, since that statement is based upon the owners' present knowledge of fuel, and there is no reason in the world why a good salesman of a competitive fuel could not change the minds of a great number of this 95 per cent.

As mentioned above, there has been practically no planned selling effort in the commercial cooking field. Rather, it is a *buying* effort on the part of all concerned. The restaurant owner decides he needs a new piece of equipment, so he shops around various dealers or gas companies until he finds what *he thinks* he needs. He then places the order, and the dealer or gas company in turn places the order with a manufacturer who ships the equipment ordered. No one makes any great effort to advise the restaurant owner as to the type of equipment he needs, and he buys only what he himself feels he needs. This is certainly selling in reverse.

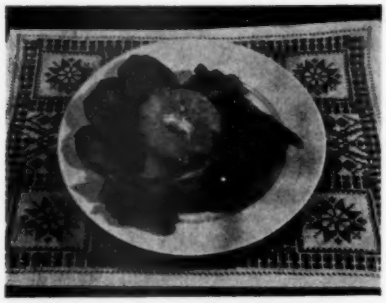
First of all, we should recognize the fact that selling commercial cooking equipment is a specialty selling job. In other words, it means that the salesman must be able to create in the mind of a prospect the need for new equipment. Restaurant owners would welcome a presentation by a salesman, pointing out how a certain piece of new equipment could increase the efficiency in the kitchen, and consequently, increase the profits at the cash register. We should, therefore, reverse the type of selling which has been done. This is largely a job for the utility because, when it becomes a battle between fuels, the utility has the greatest responsibility in proving its fuel the best. Just as surely as the manufacturers turned from coal-fired ranges to gas when it became popular, so they will turn to the manufacture of electric equipment, should the trend go that way.

Equipment Age 15 Years

The very fact that surveys show that the average age of commercial cooking equipment is fifteen years, indicates the poor selling job done. Think of the many improvements which have been made in fifteen years, and yet they have not been sold to very many users who are still getting along with old, obsolete and inefficient equipment merely because no one has sold them anything better.

We in the gas business are penalized because gas equipment does not wear out, in the sense, for example, of an electric motor which burns out and, consequently, does not run. Even though gas burners may be partially clogged or badly warped, or oven linings badly

Prepared for presentation at 1945 A. G. A. Conference on Industrial and Commercial Gas.



Popular gas-cooked restaurant meal

rusted, as long as the flame ignites, the user is not aware of a need for a new appliance. Therefore, it becomes a selling job to point the need for new equipment to such a user, even though his present equipment is still partially functioning. He will not buy new equipment until he feels that he needs it, and he won't realize a need until a salesman proves to him why he needs new equipment.

Let us consider here the steps necessary for a coordinated selling effort by the gas company, the manufacturer, and the outfitter or dealer. First let us view the gas company's portion of such a plan:

The gas company should make a survey of the users and potential users of gas for commercial cooking in the area it serves so that it will know exactly what its market is, and the type of selling organization required to best sell that market. The survey plan recommended by the Food Service Equipment Committee of the American Gas Association, if used, will provide this information.

Dealer Relations

Next, a decision must be made by the gas company whether it intends to sell direct to the consumer, or whether it plans to cooperate in sales with the outfitters and dealers. It is important that this be given careful study, since, if the gas company too aggressively sells to consumers, it may be resented by the dealers and may cause them to push the sale of appliances using other fuels. However, if a cooperative plan is effectuated, the company can get the dealers' loyalty to gas as a fuel and their cooperation in any sales program which it may initiate. The plan decided upon will, of course, determine the number and type of salesmen required by the company.

Then the gas company should set up a commercial cooking appliance sales department whose sole purpose would be to promote the sales of gas and gas appliances to all users and prospective users. In a great many companies today, this task is assigned to the Industrial Engineer. With all respect to the Industrial Engineer, it is unfair to give him this responsibility for which, in many cases, he is not fitted by training or experience, nor does he have the time available to do the job. Fundamentally, this is not an engineering problem, but rather, a selling problem. The time has come when active, aggressive, trained salesmen must be put into the field to call on all users and prospective users of gas commercial cooking appliances. Selling gas commercial equipment is basically no different than selling refrigerators, water heaters, or domestic ranges. The same selling methods and plans can be adapted to this task.

These salesmen must be carefully selected and thoroughly trained in all phases of commercial cooking, restaurant operation, and must be able to present sound arguments as to why "gas will do it better." They must be able to talk the language of the chef, the cook and the owner. If a cooperative plan is used, dealers must be regularly contacted and sales assistance given them whenever needed.

The electric industry, in 1941, issued a very comprehensive sales training manual of commercial electric cooking which covers, among other things, such items as the market, the restaurant man, operating costs of a restaurant, food costs, various hints on selling the equipment, and a comparison of electricity with other fuels. A similar manual, better in many respects, will soon be available to the gas industry and it should have the support of every gas company, manufacturer and dealer.

One of the big problems involved in the sale of commercial cooking appliances is the fact that in a large number of cities there is no suitable display of equipment which a prospect can see. Merchandise must be shown to be sold. The gas company should seriously consider setting up and maintaining a suitable display where a salesman can bring his prospects. If a dealer cooperative plan is operated, the display should be open to all the dealers' prospects as well.

Cook operating large-capacity gas deep-fat fryer such as is used in restaurants

The matter of service is one which requires serious consideration and very careful planning since, regardless of how good the appliance or the fuel may be, unless the user is assured of service when he needs it, he will not long remain sold on our products. There are some gas companies which have done an outstanding job in rendering service,

but in the great majority of cases no well-defined service plan has been in operation.

There are two types of service—one can be called maintenance and the other is actually taking care of break-downs. It seems feasible that a general service policy should include both of these types. Regular calls should be made upon the user of commercial gas cooking appliances, the appliance carefully inspected and minor adjustments made. This type of service should be on a regular schedule basis. For example, some of the larger users should be inspected weekly and then range down to the smaller users, where quarterly inspections would be sufficient. This immediately does two things, it keeps the owner impressed with the fact that gas is the best fuel, and that the gas company gives the best service.

Some companies have a policy of making minor adjustments only, but when a replacement of parts is necessary, they ask the owner to call in an outside service company to make the replacement. This is bad policy because it means the owner must go to two sources for proper service, which he resents, and it is difficult for him to understand why the gas company man recommended a replacement of parts but can't actually make such replacement. If the service men are properly trained, they can also render very valuable aid to the sales department by constantly reporting the condition of the appliances in each owner's place of business, and when a new appliance is indicated, the service man can pass this information on to the sales department.

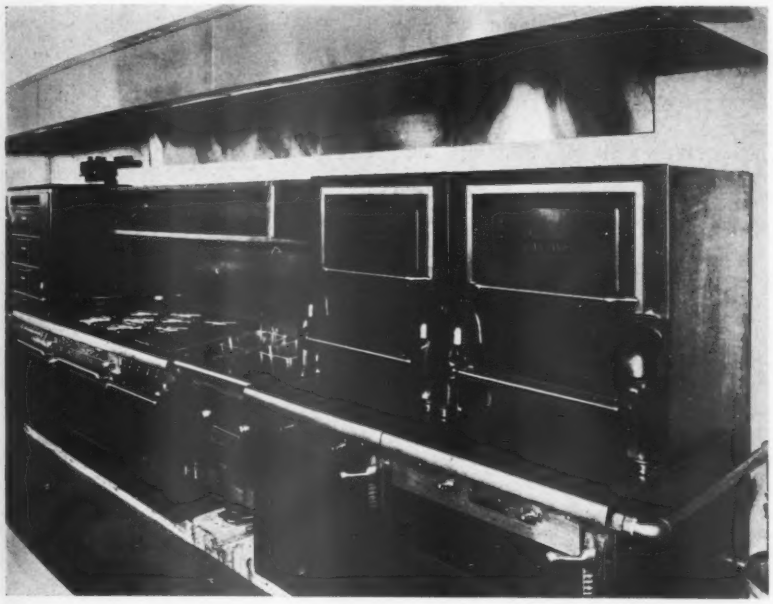
As for the actual service when a break-down occurs, this should be available twenty-four hours a day every day of the year, so that an owner is assured of uninterrupted use of his equipment.

The question, of course, arises as to how much service should be rendered without charge and it is a question which the individual company must decide. However, this much is certain, that any owner is agreeable to paying a reasonable service charge because he cannot afford to have his equipment out of operation for any length of time. A regular service contract, on an annual basis, could be drawn up and sold to the users of gas equipment, calling for a stipulated sum of money to be paid for regular maintenance service, plus of course, any parts which might be required during the course of a year. This type of service contract has been successfully used by a number of other industries, and there is no reason why it could not be used by the gas industry.

The matter of financing sales is another item which the gas company should consider. There never has been any definite finance plan for the sale of commercial appliances that we know of. There seems to be no reason why a finance plan could not be set up which would make it possible for the purchaser to pay for an appliance over a period of months. Undoubtedly if such a plan were available it would go a long way toward turning some of the present purchasers of used equipment into purchasers of new equipment. A great many prospects buy used equipment simply because they feel they cannot obtain suitable financing terms on new equipment.

We realize, of course, that in the case of large buyers, such a plan has no appeal, but when we consider that there are well over three hundred thousand eating places in the country, of all sizes, it must be obvious that a great portion of these are of the small variety and could be sold new equipment if they could be shown how they could finance it.

Advertising and promotional activity on gas commercial cooking equipment is another matter in which the gas company must lead. The gas company must make all the plans for stimulating the sales, either through its own organization, or through the dealers' organization in the case of a cooperative plan.



Typical battery of specialized heavy-duty gas cooking equipment

Co-ops

● Cooperatives are getting set to invade the appliance field, according to *Business Week*. Following the favorable vote of the appliance committee and the executive committee of National Cooperatives, Inc., last month, steps will be taken at once to prepare for postwar distribution of such items as refrigerators, radios, water-heaters, home freezer units, washing machines, vacuum cleaners, toasters, stokers, irons, and other home and farm appliances.

This is a first step in the postwar program of the cooperatives for diversifying their products and services to offset present emphasis on farm supplies and to increase measurably the number of U. S. consumers—now less than 10% of the population—who are co-op patrons.

Plans for appliance distribution contemplate establishment of repair and service facilities through local and regional cooperatives.

As a general thing, the dealers do not have the time nor the ability to map out promotional activity, but the gas company can do so and tie in the dealers in its area.

Now let us consider the responsibility of the manufacturer of the appliances in such an expanded selling program. The biggest contribution the manufacturer can make is in the product itself. It is very important that manufacturers do more research and better engineering of their products. This has been thoroughly covered by the Commercial Appliance Study Committee headed by Frank H. Trembly, Jr., which has made some very valuable recommendations as a guide. Manufacturers should keep this report constantly before them and in considering new products should measure them against the recommendations made. New materials should be studied with the view of building greater strength and durability into the appliances; greater conveniences for the users must be given consideration.

Manufacturers should do more to train their own salesmen on the selling of commercial appliances, and should set up a program for the training of the dealer's and gas company's salesmen. Obviously, the manufacturer knows all the selling points of his appliance and he should see to it that the retail salesmen know as much about it as he does. A sales training program is one of the most important contributions the manufacturer can make to such an activity. The manufacturer's representative must act as a liaison man between the gas company and the dealers in each area, so that if the gas company formulates plans for a sales activity, the manufacturer's representative will see to it that his dealer ties in with such activity.

The manufacturer is charged with the responsibility of advertising his product and also getting suitable publicity and news stories. Manufacturers have been weak in these latter two departments and certainly can do more to publicize commercial gas cooking appliances.

The manufacturer's representative should make it a point to spend considerable time in the field with the salesmen of the dealers and the gas company, and should lend every assistance in recommending equipment to a prospect and in closing sales.

Now we come to the third party in this selling plan—the dealer. It is safe to say that the dealers have done very little actual selling of commercial cooking appliances. This, of course, is not true in the case of large users such as hotels, hospitals, clubs or institutions, who usually consult a dealer on an entire kitchen layout. In these cases, the dealers have done an outstanding job in selling the equipment, but in the case of the small restaurant owner, there has been practically no effort on the part of the dealer to sell them.

It is true that the dealer's salesman calls quite regularly on these restaurants in the interest of selling china, silverware, napkins and dozens of other small items, but very rarely does that salesman try to sell the restaurant owner a new cooking appliance. It is easy to understand why this is true. The salesman usually has a lot of calls to make and hasn't the time to spend with each restaurant owner in the interest of selling a new range or other appliances. His interests are primarily in selling those items for which there is a continuing demand. When he sells a gas range usually the restaurant owner is taken care of for a number of years, insofar as a range is concerned.

The manufacturer and the gas company both are to blame for this condition, and both of them must work together to correct it. They are the ones who must set up a sales program which will interest the dealers and their salesmen sufficiently so they will get behind it and actually go out and aggressively sell cooking equipment.

In most cases, the dealers have either no display or a very poor display of one or two appliances, with the result that the dealers' salesmen feel handicapped in any effort they may make to sell equipment because they have nowhere that they can show it. The manufacturers should certainly insist upon their dealers carrying a better display of their merchandise and should work with the gas companies in setting up a display which would be open to the dealer's salesmen and prospects.

The dealers must be sold on the idea that selling gas commercial cooking appliances is a *(Continued on page 130)*

Problems of a Gasless Hospital

● There is a hospital in France that does not cook with gas, but Lieut. Lois Schumaker, Medical Department dietitian from Faribault, Minn., still supervises the preparation of 4,000 to 7,000 meals a day. In the absence of gas, meals are prepared in gigantic steam vats, only a part of the modern equipment available in the white-tiled kitchen of this 108th General Hospital near Paris.

In answer to questions about the problems facing an Army dietitian Lieutenant Schumaker said: "Even in a modern kitchen like this the problems are many when gas cannot be used. It immediately threatens daily meals with a uniform drabness that is difficult to overcome. We cannot serve such important variations as steaks, chops, toast, hot cakes and pastries, but since we still draw these rations, or their ingredients, a way must be found to prepare them.

"Since some of our steam cookers can be brought up to a pressure of eight pounds, we can do some roasting of meats and fowl. But here again is a new problem; these same vats must cook other foods, so it is necessary to do all roasting at night, thus creating the problem of serving it hot. It's a vicious cycle. Often, to eliminate roasting, we hit upon some strange dishes—hamburger and noodle stew, for instance."

Lieutenant Schumaker said that desserts were a problem and a lack of baking facilities made puddings and canned fruits a standard. She and her staff have been experimenting with frozen desserts in an attempt to whip up something so startling that soldiers would forget about pumpkin pie.

"Difficulties like this, as long as they can be solved, must make the work interesting, but what really hurts a dietitian is not being able to correct problems when they arise," she said. "For two weeks after our arrival here we could serve nothing but C rations and an occasional so-called 'ten in one' for variety. On one unforgettable day all hands pitched in to open over 4,000 cans." She added as an afterthought: "We're still looking for the person with enough foresight to have plenty of can openers handy. He deserves a citation, since we'd have starved without them."—*N. Y. Times.*

Underground Gasification

British authority reviews Russian developments and finds much of interest but accurate evaluation not yet in view

BY E. T. WILKINS, Ph.D., M.Sc.

Fuel Research Station, Department of Scientific and Industrial Research

Dr. E. T. Wilkins

THE idea of gasifying coal underground is at least 76 years old. Reference was made to it by Siemens,[1] Mendeleeff,[2] Betts[3] and Ramsay;[4] and in about 1913 preparations for an experiment were begun in this country, but war broke out before any trials had been started and the working was abandoned.

Russia alone retained interest, and following the formation of the Podzemgaz State Trust in 1933, experimental work was carried out on an ambitious scale with a view to establishing industrial plants, and some 1,500 workers were employed at research establishments. Several experimental methods were tried, and by 1935 a semi-industrial plant was in operation, producing about 300 million cu.ft. of gas in a period of 18 months.

War Halted Russian Plans

Experiments were continued in various coal fields, and by about 1938 plans were made for at least three full-scale industrial units in the Donetz, Ukraine and Siberia. The largest of these was designed to produce 14 million cu.ft. of gas per hour,[5] equivalent in thermal output to nearly 500,000 tons of coal a year. These plans were undoubtedly dislocated by the war and no data are available concerning the actual construction or operation of plant. However, from the fact that these ambitious projects were planned it must be inferred that the Russians expected no insuperable operating difficulties under carefully chosen conditions.

In considering the possibility of applying similar methods in this country it is important to realize that, in the U.S.S.R., underground gasification is part of a larger plan, which involves the concentration of interdependent industries.

It has been proposed[6] that the underground gasification stations, for example, should provide the gas for town's supply (possibly after enrichment), for electricity generation and for chemical and other industries.

An example of interdependence apparently already in existence is the use of the gas in an ammonia synthesis plant which returns oxygen (obtained as a by-product from the manufacture of nitrogen) for use in the gasification process.[7] It is also hoped to synthesize petrol, oil, etc., from the underground gas by the Fischer-Tropsch process.[6]

It will be evident that some of the problems associated with the utilization of underground gas find a more ready solution in a country undergoing rapid industrial development, than would be possible where there is a more established industrial organization. It, therefore, does not follow that the potentialities of underground gasification in Russia are necessarily any criterion of its potentialities in this country; nevertheless, the scheme warrants serious consideration for future developments.

In addition to the technical background of this process, there is an important sociological one. Considerable stress has been laid, both in Russia and in this country, on the desirability of dispensing, as far as possible, with the uncongenial labor of the coal miner. In 1941 it was reported[8] that whereas about 70 per cent of the labor in Russian coal mines consisted of underground workers, in the underground gasification stations the figure was 15 per cent; and the average output per man employed was correspondingly increased from 30 tons of coal a month by mining, to the equivalent of about 100 tons (possibly rising eventually to 500-600 tons) for the gasification stations.

On account of this and other advantages claimed for underground gasification the view is occasionally expressed that the mining of coal is now an obsolescent process. It is therefore interesting to note that the Russian experiments do not appear to have been planned with a view to the displacement of mined coal.

Gasification Experiments

Details are available of five coals on which gasification experiments have been carried out, and all possess features which appear to render them difficult for winning by ordinary mining methods. It therefore seems that, up to the present, underground gasification has been considered mainly as complementary to coal mining.

In order to keep these developments in their right perspective, it should be noted that coal mining in Russia was expanding before the war at a rate far in excess of that occurring in any other part of the world. Some data on the coal production and the approximate number of miners employed in recent years are given in Table I.

It is, therefore, suggested that the Russian experiments, and the possible application of a similar technique in this country, are best considered as a means of increasing the economically available coal resources without serious upheaval of the existing coal industry.

TABLE I

PRODUCTION OF MINED COAL (EXCLUDING LIGNITE) IN U.S.S.R.

Year	*1920*	*1925*	*1930*	*1935*	*1938*
Output (millions metric tons)*	8	17	47	104	133
Men employed (thousands)†	22	47	130	290	370

*Data obtained from Colliery Year Book (Louis Cassier Co., Ltd.), 1944, page 635.
†Estimated from data given in.[8]

Reprinted from *The Gas World*, London, November 25, 1944, which obtained it from the *Fuel Economy Review*.

Methods of Gasification.—In all the methods so far employed by the Russians the aim has been to burn the coal in a stream of air (sometimes enriched with oxygen) with or without steam, under conditions favorable for the formation of carbon monoxide.

In the early experiments the coal was broken, either by hand[6] or by explosive charges embedded at intervals in the seam,[9] so as to simulate as nearly as possible normal producer gas practice. These methods, however, were extravagant in labor and not satisfactory technically, and they are now considered obsolete.

Three Methods

The following three methods have been used in more recent work and are said to be suitable for use under various conditions:—

(1) *Stream Method.*—This method has been applied successfully to coal seams which dip steeply, and Fig. 1 is a simplified version of the general layout. Two galleries, which may be about 60 yards long and 100 yards apart, follow the dip of the seam and are joined at their lower ends by a horizontal gallery A. These three galleries thus isolate the rectangular panel of coal which is to be gasified. Connections with the surface are made through shafts B and C.

The coal is ignited by lighting a fire in gallery A, and is supplied with air through shaft B. The resulting gases are withdrawn from C. As the coal surface of the gallery A burns away, the fire zone advances upwards along the seam. The ash, together with any of the roof which may fall, collects in the space below the fire zone. Thus, apparently, three difficulties are largely overcome; the burning coal face is kept free from accumulations of ash, the air flow is kept in the neighborhood of the burning coal, and falls of roof do not readily block the passage or engulf unburned coal.

Eliminating Underground Labor

This method, which was that used in the semi-industrial plant already mentioned, has been the most successful so far, but it suffers from the disadvantages that it is not applicable to other than steeply dipping seams, and it necessitates some preparatory hand working. Much effort has recently been put into attempts to eliminate hand working altogether by cutting passages through the coal by means of high pressure water,[10] and by burning with a jet of oxygen,[11] but no information is yet available as to whether these methods have been effective.

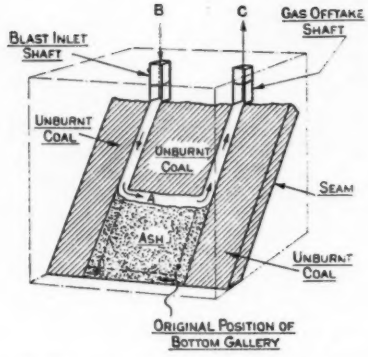


Figure 1. Stream Method of gasification

(2) *Percolation (or Filtration) Method.*—This method, which eliminates all underground labor, is intended for use with horizontal seams, and is based on Betts' original British Patent.[3] It depends on the development of shrinkage cracks and fissures in the coal when heated, so that part of the seam becomes readily permeable to gas.

This condition is brought about by making borings from the surface which are arranged as shown in Fig. 2 (b) in concentric rings of 20-40 meters radius, or in other regular arrangements. Fig. 2 (*a*) illustrates the method of burning.

The coal at the bottom of the central borehole (No. 1) is fired, and combustion is maintained by air or oxygen supplied through a central pipe A. Initially, the products pass up the annulus and away via the valve B, but as the coal becomes heated and fissures form, it becomes possible to pass the gases through the seam to one of the boreholes (e.g., No. 2), in the first concentric ring, which has been fired in a similar manner. The flow is then as shown in Fig. 2. When the coal lying between these two holes has been gasified, hole No. 2 is closed and the next hole (e.g., No. 3) is brought into use, and so, it is claimed, the whole seam may be worked out.

A combination of the percolation and stream methods has also been proposed.[12]

(3) *Borehole-Producer Method.*—This is stated to be suitable for inclined or horizontal seams, especially when the roof is soft. Two parallel galleries are driven through the seam about 100 yards apart, and these are joined at 5 yard intervals by boreholes 4 in. diameter in the plane of the seam. These holes are sealed at the ends until they are required for gasification, and each is fired in turn by an electric device operated from above ground. Air is supplied through one gallery and the gas withdrawn from the other. As the coal burns away the borehole enlarges until it becomes approximately the diameter of the seam. It is then abandoned, and another started up, but it is not clear how air is prevented from by-passing through the burnt-out boreholes.

This method apparently is only intended for use when other methods are unsuitable.

Oxygen Enrichment.—In normal producer practice the use of broken coal ensures an ample reacting surface, and the relatively small passages ensure that all the air is brought into contact with the hot fuel and that the temperature is sufficiently high to allow the reduction of carbon dioxide to carbon monoxide. In the above methods of underground gasification the reacting surface is the wall of a gallery or other passage through the coal seam, so that the coal surface is relatively small, and there may not be intimate contact between air and coal. Consequently, there has been some difficulty in maintaining an output of gas of sufficiently high quality, probably due to low temperatures in the reaction zone, and the by-passing of air which reacts later with the gas made.

In more recent experiments, therefore, it has become customary to induce

Protection

● As a means for sure identification of coal, crushed rock and similar bulk materials, R. E. Miskelly of Plymouth, Mass., proposes to spray them with a chemical that fluoresces on being irradiated with ultraviolet light; he has received patent 2,367,040 on this invention. The ordinary daylight appearance of the commodity is not changed, yet a means is thus provided for protecting it against theft, adulteration and other abuses.—*Science News Letter*

a more vigorous reaction by increasing the oxygen content of the blast, although it is claimed[6] that this enrichment is not essential. Even when the blast contained 30 per cent of oxygen the resulting gas contained over 10 per cent of carbon dioxide and it may well be that, in general, a supply of oxygen for air enrichment is desirable for satisfactory underground gasification.

By adjusting the concentration of oxygen it is said to be possible to control the temperature so that it is always high enough to favor the formation of carbon monoxide and yet not so high that slagging of adjacent strata occurs.[13]

It has been estimated[14] that oxygen of 90 per cent purity might be produced for 6d.-8d. per 1,000 cu.ft. On this basis it may be calculated that if this oxygen were used to enrich the blast to 30 per cent oxygen content, as in some Russian experiments, the cost of the oxygen spread over the total thermal yield would amount to about 0.6d. per therm. If the cost of oxygen after the war proves to be higher than this figure it may be that a less pure, and cheaper, grade of oxygen would have to be considered.

Intensive research has been carried out in Russia on the preparation of cheap oxygen by the liquefaction of air by a process in which the expansion and cooling of the compressed air take place in a high-speed turbine.[15] It is, however, not certain whether this development, which is a continuation by Kapitza of the work which he began in this country some years ago, has yet been applied on a large scale.

The conclusion would, therefore, appear to be that oxygen enrichment would add an appreciable, but possibly not prohibitive, amount to the cost of gasification.

Gases Made.—By varying the technique it has been possible to vary the composition of the gas to meet different requirements. Three different gases have been generated, and their compositions and calorific values are given in Table II.

(a) Producer Gas, obtained by continuous blowing with air, with or without added oxygen and steam.[6] The figures given in Table II (*a*) show the result obtained with a blast containing 27-30 per cent of oxygen.

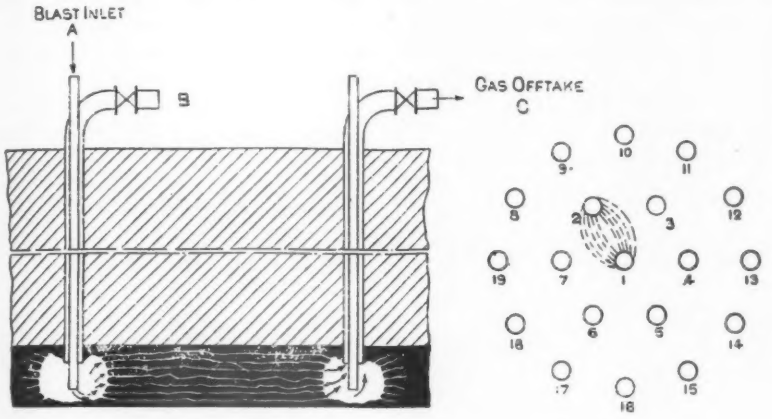


Figure 2. Percolation (or Filtration) Method intended for use with horizontal coal seams

(b) Water Gas, generated by alternate 20 min. blasts of air and steam.[16]

(c) Hydrogen-rich Gas, made by a technique which was said to work satisfactorily over a long period.[5] Air was blown into the seam (stream method) at a pressure of 3.5 atmos. for 4-6 hours to produce a gas similar to (*a*). The blast was then shut off for a similar period and during this time a gas was evolved having a mean composition and calorific value as shown in column (*c*).

The production of hydrogen-rich gas in these experiments has been attributed[6, 16] to the preferential diffusion of hydrogen into the adjacent strata during the blow period, followed by the release of this gas when the pressure was reduced. It may be that some of the gas resulted from the carbonization of the coal in the neighborhood of the reaction zone after the interruption of the blast.

The Russians attach considerable importance to the manufacture of two qualities of gas in this way. It is proposed to use the gas of lower calorific value as power gas in boiler installations or gas turbines for electricity generation, and the hydrogen-rich gas for chemical processes such as the synthesis of ammonia and liquid fuel (Fischer-Tropsch process).

Effects of Seam Characteristics.—Table III gives some of the available information on trials carried out on coal seams of different characteristics. Details are in some cases incomplete, partly because of omissions from the original papers, and partly because some of the Russian journals describing this work are not yet available.

It is, however, possible to make some tentative deductions from these results which indicate some of the factors to be borne in mind when considering the possible application of this technique to British coals.

(a) The Dip of the Seam.—The most successful process so far employed is undoubtedly the stream method, and the results obtained at Gorlovka by this method are widely quoted as an example of what may be achieved by underground gasification generally. Here a word of caution is necessary. The seam at Gorlovka dips at an angle of about 70°, and the method of gasification employed is one which is said to be inapplicable to other than steeply dipping seams. Its usefulness in this country would, therefore, presumably be limited.

For the treatment of horizontal seams it is usually assumed that the percolation method (attractive on account of its not requiring any underground labor) would be applied. This raises the question as to whether this method is suitable for coals differing in type from the brown coal to which it has so far been applied.

(b) Coal Type.—From the Russian references to the percolation technique it appears that for satisfactory working the coal must develop fissures on heating,[12] so that the gases may pass through the seam between the two boreholes. This limitation appears to exclude coals of low volatile matter such as anthracites and dry steam coals which undergo little or no shrinkage on heating. It

TABLE II

THREE TYPES OF GAS MADE BY UNDERGROUND GASIFICATION

	(a) *Producer Gas* (%)	(b) *Water Gas* (%)	(c) *Hydrogen-rich Gas* (%)
CO_2	10—12	21.9	20.3
CO	23—27	15.0	11.7
H_2	12—15	50.1	44.7
CH_4	2—3	5.4	—
N_2	43—47	7.0	23.3
Calorific Value (B.Th.U./cu.ft.)	112—146	245	180 (calc.)

NOTE.—It has been suggested[17] that CO_2 would be removed from the gas before distribution.

is also evident that the coal must not soften on heating[18] otherwise it forms a plastic layer through which the gases cannot easily pass. This limitation may exclude the coking coals.

The only remaining possibilities are the non-coking high volatile coals, but even these may be unsuitable because of the relative impermeability of the coal as it occurs in the seam.[19] It is doubtful whether the fissures caused by the two fire zones would, in the early stages, span the whole 20-40 yards of coal through which the gases must pass, and, if this is the case, then a high permeability or porosity of the coal substance is necessary for this process. It has been shown[20] that generally speaking the high volatile (i.e., low carbon) coals have the highest porosity of any British coals, but it is likely to be considerably below that of the Moscow brown coal. Evidence of this is afforded by the higher moisture content of the brown coal (30 per cent, as against about 10 per cent for the most porous British coals).

It will be noted that with the percolation process the gas passages in the reaction zone (i.e., the fissures) are very much narrower than with the stream method, and it is possible that the enrichment of the blast with oxygen is not so necessary as with the stream method.

(c) Coal Impurities.—It will be seen that two of the coals gasified contain 25 per cent or more of ash. If underground gasification is able to make available the energy of inferior seams, it would have a special value, particularly when the ash-forming constituents are present in a form in which they are not readily removable by coal washing processes. In one instance[18] it was reported that a large amount of ash residue was useful because it gave some support to the roof.

The coals gasified in Russia have contained up to 4 per cent of sulphur, and it is proposed to purify the gas from this impurity before distribution.[17] It therefore appears that underground gasification may improve the prospects of utilizing those seams which are at present of little value because of an excessive sulphur content.

Inherent moisture in the seam appears to present little difficulty in the gasification process, but when water finds its way into the coal seam from adjacent strata the heat loss may be sufficient to give trouble.[21]

(d) Gasification of Thin Seams.—It will be noted that one of the seams on which experiments have been carried out was about 16 in. in thickness; normally such a seam would present considerable difficulty in economical working. The gasification of thin seams is said to be made possible by the small heat loss into adjacent strata.[21]

(e) Fire Hazard.—The seam at Leninsk is thick, horizontal and of low ash content, but there is some indication from the literature that this seam is prone to spontaneous ignition. In this case it may be that the Russians consider underground gasification a possible means of eliminating a fire hazard that would be incurred if this seam were worked by ordinary methods. Gassy seams could presumably be considered from the same point of view, and it has also been suggested[19] that some of the firedamp absorbed in the coal and adjacent strata would be recovered with the producer gas, and add appreciably to the calorific value.

(f) Seam Depth.—All the Russian experiments have been carried out on relatively shallow coal seams, and this minimizes the cost and effort involved in the preparatory work. For example, assume that the percolation method is being applied to a 6 ft. seam of coal

TABLE III

DETAILS OF SEAMS GASIFIED

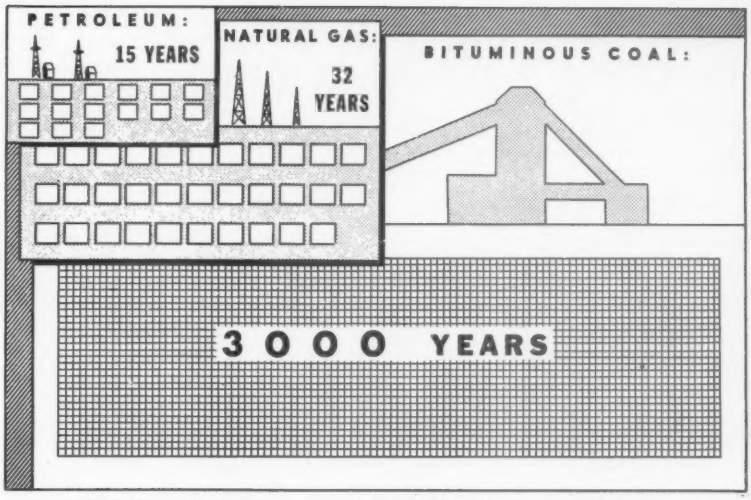
			Coal			*Seam*			
Expt.	*Date*	*Site*	*Type*	*Volatile Matter*	*Ash*	*Working Depth*	*Thickness*	*Dip*	*Method*
				(%)	(%)	*ft.*	*ft.*		
1	1933	Schachtinsk (Donetz)	Anthracite	2.5	4.5	—	1.3	20°	Modified stream (broken coal)
2 (*a*)	1935	Gorlovka (Donetz)	Coking steam (?)	17	29	200	6	70°	Stream (experimental)
(*b*)	1938	"	"	17	29	400	6	70°	Stream (intermediate scale)
	1935	Lisichansk (Donetz)	"Long flame"	35	12	80—110	2.5	43°	Borehole—Producer
4	1934–5	Leninsk—Kuznetzk (Siberia)	"Forge coal"	44	3.5	65	16	2°	Borehole—Producer
5 (*a*)	1933–6	Krutov (Moscow)	"Low Grade"	—	25	65	5	0°	Borehole—Producer
(*b*)	1939–41	"	Brown coal	—	—	—	—		Percolation

existing at a depth of 65 ft. as at Moscow, and that the boreholes are spaced 30 yards apart. Then each borehole would make available about 1,000 tons of coal. The cost of boring depends on a number of factors, including the type of rock and the size of drillings required, but assuming an optimistic figure of £1 per foot for a 10 in. diameter hole, then the cost for drilling is 16d. per ton of coal available for gasification. If it were economic to spend as much as, say, 10s. per ton on drilling, then the maximum depth of drilling for a 6 ft. seam would be 500 ft.

If a number of seams occurred close together it is possible that a method could be devised for working them from the same boreholes. This, however, introduces many complications.

(g) Percentage of Coal Gasified.—No definite data have so far been obtained on this aspect of the process. One reference[22] says that the proportion of coal gasified is at least as great as that recoverable by normal methods of mining, but the source of this claim is not disclosed. On this point it has been suggested[23] that the process may be compared to an underground carbonization process in which the products of combustion of the heating gases are mixed with the distillation products, and coke is left underground. It is worth noting that at Schachtinsk an anthracite containing only 2.5 per cent of volatile matter was gasified by a process which resembled the stream method, except that there was preliminary breaking of the coal.

(h) Cost.—The cost of producing gas by underground gasification is said to be about one-third of that with normal producers.[8] In one instance the figures are given as between 7.5 and 18.75 kopecks (1d.-2d.) per therm, against 37.5-62.6 kopecks (4d.-6d.) for normal producer gas.[24] The capital expenditure is said to be 60-70 per cent of that of normal gas generator plans, the principal costs being those of the blast and power supply installations.[22] These figures, however, have little meaning without details on how they have been deduced.



United States fuel reserves as estimated by the Bituminous Coal Institute

Summary

Of the two most attractive methods of underground gasification, one appears to be applicable only to steeply dipping seams, and the other to require coal properties not found in all British coals. The methods so far tried in Russia may not be suitable for application to coal seams now being mined by conventional methods, but it may be that they can be applied to certain seams which now present difficulty in working. This conclusion conforms to the Russian precedent, for in that country experiments appear to have been confined to seams which present some difficulty in mining for various reasons, including (i) thinness of seam, (ii) excessive angle of dip, (iii) underground fire hazard, (iv) high ash content of coal.

There are known difficulties in operation, such as that of maintaining a regular supply of gas; and information on a number of points is lacking. Until more information is available, the potentialities of the process in this country cannot be accurately assessed.

Acknowledgments

The author's thanks are due to Dr. L. J. Jolley for assistance in preparing this paper, to R. A. A. Taylor for translating original Russian papers, and to Dr. N. Booth for providing information gathered from the literature.

This paper is presented by permission of the Director of Fuel Research.

REFERENCES

[1] Siemens, W., *Trans. Chem. Soc.*, 1868, *21*, 279.
[2] Mendeleeff, D. I., Severny Vestnik (St. Petersburg), 1888, No. 12, Sect. II, p. 26.
[3] Betts, A. G., B.P. 21674 (22.9.1909).
[4] Ramsay, W., *The Times*, 25.3.1912; 7.6.1912.
[5] Gumz, W., *Gluckauf*, 1940, *76*, 210.
[6] Chekin, P. A., Seminov, A. I. and Galinker, J. S., *Trans. Chem. Eng.*, Congress of World Power Conference, 1936, Vol. III, 158.
[7] Wassermann, J., *Ind. Eng. Chem.*, News Ed., 1936, *14*, 5.
[8] Beniaminov, N., *Chem. and Ind.*, 1941, *60*, 164.
[9] Kirichenko, I. P., *Ugol*, 193, No. 101, 90.
[10] Kirichenko, I. P., *Vest. Inzh. Tekh.*, 1940, No. 5, 280.
[11] Korobschanskii, I. E., Russ. Pats., 44294 (30.9.1935), 53992 (31.10.1938) (Chem. Abst. 1938, 3130; 1941, 1604).
[12] Chukhanov, Z. F. and Sagaidak, M. Ya, *Bull. Acad. Sci.*, U.R.S.S., Cl.sci.tech., 1939, No. 8, 3.
[13] Buyalov, S. I., *Ugol*, 1939, No. 4-5, 18 (Chem. Abst., 1940, 146).
[14] Evans, E. V., *Trans. Inst. Gas Eng.*, 1939, *87*, 814.
[15] Kapitza, P., *J. Physics* (U.S.S.R.), 1939, *1*, 7-28.
[16] Sazonov, N. I., *Khim. Tverdogo Topliva*, 1935, *6*, 861 (Chem. Abst. 1937, 1583).
[17] Skafa, P. V., *Gas Times*, 1941, *27*, 194.
[18] Lavrov, N. V., Farberov, I. L. and Pitin, R. N., *Vest Inzh. Tekh.*, 1939, No. 10, 423. (Chem. Abst. 1940, 1461).
[19] Graham, J. I., *The Times, Trade and Eng. Rev.*, June, 1944, No. 964.
[20] Ann. Rep., Director of Fuel Research, year ended 31st March, 1938, p. 91.
[21] Chukhanov, Z. F., compt. rend. Acad. Sci. U.R.S.S., 1940, *27*, 203. (Chem. Abst., 1941, 600).
[22] Rose, H., "Science and Technology in the Soviet Union," Marx House, 1942, p. 12-15.
[23] Thring, M. W., *B.C.U.R.A. Bull.*, 1943, *7*, 208.
[24] Buyalov, S. I., *Ugol*, 1939, No. 11, 17. (Chem. Abst., 1940, 1461).

Non-Stoop

● A kitchen sink high enough for a tall woman to wash dishes without fatigue (with step available for shorter maids) is a feature of the ultra-modern home of Sir William Beveridge, M. P. Master of University College, Oxford, and author of the much discussed Beveridge plan. Shadowless lighting is another Beveridge kitchen idea. Lady Beveridge now wants higher ovens with interior lighting, transparent doors and large thermometers with colored figures. She is waiting, too, for some one to invent a means of sliding dishes forward from the stove to prevent burned fingers.

Manila Gas Plant Partially Saved When Employees Defy Japanese

A WIRELESS story by Homer Bigart, published in the February 14 *New York Herald Tribune*, gave the following account of the ordeal experienced by employees of the Manila Gas Corporation when the utility plant became the center of the battle for the Philippine capital:

In a cluster of company houses near the gas works across the Pasig River, thirty Swiss civilians have been living through a week of terror in what is now the hottest battleground in Manila.

Most of them are employees of the Manila Gas Corporation, Operated by Stone & Webster Service Corporation, of 90 Broad Street, New York City. With the typical stubborn courage of the Swiss, they refused to leave when the Paco became a bloody no-man's land, heavily mortared by the Japanese.

Sitting in a neat wooden house near crumpled gas tanks, William Scheunig, the leader of the Swiss colony, told how employees succeeded in saving half the plant by removing dynamite which the Japanese planted in Diesel engines through the works.

"At 10 o'clock Sunday we saw some Japanese soldiers leave the plant," he said. "We thought they had gone for good. Immediately we combed the plant, removing dynamite charges and a 125-pound bomb they had put in one of the gas tanks.

"But on Monday six Japanese marines and an officer came back. When they found the demolition charges had been taken away, the officer ordered his men to bring me in at bayonet point. I told them I knew nothing about any explosives because I had been too busy fighting fire around the houses to watch the plant."

The Japanese finally left, but the officer ordered the Swiss to leave the compound. The little colony stayed, however, and on Thursday night the Japanese tried to burn them out. Fred Ackerman and his wife were awakened by noises in their cellar. Ackerman crept to a window and saw a Japanese emerge, fire six bullets into the cellar and run. The Ackermans raced downstairs, Mrs. Ackerman smothering fire with wet rags. The cellar had been doused with kerosene.

Fearing a second attempt to burn them as they slept, the Ackermans picked up their four-month-old baby and started across the yard. Ackerman was shot through the chest. His wife stumbled behind a banana tree, shielding the baby with her body until the firing ceased. Then she crawled back into the house.

Ackerman lay in the grass all night, doubled up in agony. Bracing himself on an elbow, he began to push himself toward the house. After several hours he reached the steps and his wife helped him into the building.

When the Japanese took over the plant the Swiss were not badly treated. The Japanese needed their technical skill. But after the Leyte landings repressive measures were introduced. A burly Spanish-Filipino mestizo, known to the Swiss as "The Spy," kept informing on the employees.

The day before the Americans entered Manila Wernor Teucher, the representative of a Swiss electrical firm, was arrested on Jones Bridge and carried off to a military barrack where he was accused of maintaining contact with the American guerrilla leader. Teucher was thrown into prison, but was liberated the next day when a mob of Chinese Filipinos opened the cells.

"Four months ago the Japanese told us to report for forced labor one day a week. We were to work on air-field defenses. We refused arguing that as neutrals we could not be compelled to work on military installations. Finally the Japanese commander granted us exemption, but ordered all Filipinos and Spanish employees to report."

Scheunig gathered eight families in the gas works and painted Swiss flags on half a dozen of the company houses. More than 10 other Swiss, he said, were in various parts of the city, mostly in Japanese-controlled districts.

The first public utility chartered in Texas was a gas company at Galveston which received its charter in a special grant from the Legislature in 1856.

All-Time Gas Output Records Broken As Cold Wave Steps Up Demand

COLD waves throughout the country, unprecedented in length and severity, brought such tremendous demand for gas that many utilities were forced to take drastic action to prevent serious curtailment to war industries. Already carrying the greatest gas load in history as a result of war loads, many companies were forced to appeal to customers through newspapers, radio and other mediums to go slow in their consumption of this vital commodity.

The American Gas Association, following a request by the Office of War Utilities of the War Production Board, prepared a series of fuel conservation advertisements for local use, recommending that indoor temperatures not exceed a maximum of 68 degrees. Many companies used these ads and others of their own origin as shown in the display on the opposite page. The War Advertising Council estimated that such home fuel conservation advertising was among the six largest campaigns in support of the war effort.

Both natural and manufactured gas areas were affected by the abnormal weather. In the natural gas industry, the situation was particularly severe in the vital Appalachian industrial area. Edward Falck, director of the Office of War Utilities, in January and again in February declared that a critical situation had developed as a result of extraordinary drains upon natural gas supplies and appealed to all consumers throughout the area to cooperate in order to avert a breakdown of distribution facilities.

As a result of a gas shortage in the Appalachian area, the War Production Board on February 19 instituted a 48-hour ban on the use of natural or mixed gas in amusement places. This was the second such ban this year. Short fuel supplies had cut war production in some major industrial cities. The WPB also announced an emergency diversion of 20,000,000 cubic feet of natural gas daily into Ohio, particularly hard hit by the cold wave.

In manufactured gas territories, similarly critical situations were met. In Brooklyn, for example, the cold wave the latter part of January put The Brooklyn Union Gas Company to the severest test in its 97-year history. Soaring to an all-time high sendout of 153,456,000 cubic feet, far above the previous record, on Thursday, January 25, it was "touch and go" between the hard-working gas makers at Greenpoint and Citizens works and the thousands who—lacking kerosene and other fuels—used their gas ranges to keep from freezing.

The situation in Brooklyn was met by appealing to customers through newspapers and radio stations and by telephoning about 280 industrial plants, urging that use of gas be limited to essentials. The customers responded "magnificently," the company reported.

On four days of extreme cold, gas sendout of Consolidated Edison Co. of New York was the greatest ever experienced. The peak day was Friday, January 26, when the mean average temperature was 13 degrees and the sendout 230,908,000 cubic feet, the largest in the company's history. Similar conditions, on a smaller scale, were met in many parts of the East. The gas industry came through with flying colors and kept intact its reputation as "the dependable fuel."

Some of the fuel conservation advertisements which appeared during record cold wave.

Tidbits

●Substitute a simple defrosting operating for the complex chore of preparing hors d'œuvres for cocktail parties in the days ahead. They are beginning to come quick-frozen in a variety of appetizing little rolled-up sandwiches—cheese, cervelat, ham, olive, whatever—ready for any social emergency.


TO YOU... MRS. CONSUMER
FOR YOUR EFFORTS
Save Vital Fuels
68
Keep Your Home Temperature at 68°
Natural Gas Consumers
Conserve Gas For War Industry
When?
Now! Today! Immediately!
United Fuel Gas Co.
NOTICE
TO GAS CONSUMERS
Important Notice
To Our GAS Customers
—CONSERVE GAS
PUBLIC SERVICE
UNCLE SAM SAYS
PLEASE
USE LESS HEAT!
Tampa GAS Company
THANK YOU
and YOU
and YOU
The Brooklyn Union GAS Company
YOUR GOVERNMENT
URGES YOU TO
SAVE VITAL FUELS
GAS COMPANY NAME
YOUR HELP IS NEEDED
COLUMBIA POWER & LIGHT CO.
TAKE IT
EASY!
Portland Gas Light
Conserve Natural Gas
68
Keep Your Home Temperature at 68°
Users of Gas for Home Heating Are
Urged to Comply
With Government's Fuel
Conservation Program
THE EAST OHIO GAS COMPANY
What's Wrong With This Picture?
HARTFORD GAS COMPANY
SAVE
COAL
and GAS
Owing to the Fuel Shortage
the U. S Government re-
quests everyone to keep
their homes at not more
than 68 degrees until the
present crisis is over.
CITIZENS
GAS AND COKE UTILITY
She's Cookin' with Gas
and Helping War Industry
so are 55,000 other Hartford Women
who are conserving Gas wisely!
GAS EMERGENCY
Virginia Gas Distribution Corporation
HARTFORD GAS COMPANY
essentials.
3. Gas House Heaters—Turn thermo-
to lowest setting. Turn off individual
gas room heating equipment.
We will advise you when this emergency
has ended.
Your patriotism and your support of the
war effort demands your co-operation, please!
THE BROOKLYN UNION GAS CO.
176 Remsen St., Brooklyn, N. Y.
CONSERVE GAS
for
WAR INDUSTRIES
THE EAST OHIO GAS CO.

Postwar Exhibit at the Chicago Home Show

Miss Jean Brown of Chicago is taking a good look at the Servel Display in the recent National Home Builders' Show held at the Sherman Hotel in Chicago. She is questioning John Surbeck of Servel's Sales Department about the postwar possibilities of gas refrigeration

Woman Head of Utility Holding Company Does a Man-Sized Job

Vera B. Seymour

VERA BRANDHILL SEYMOUR, who as president of the American Gas & Power Co., once a vast public utility holding system, has steered her corporation through three years of "headaches" in complying with the Holding Company Act, is going to retire after ably disapproving the old "gag" that a woman's place is in the home.

Now, as American Gas plans to sell its fifth subsidiary, Savannah Gas Co., and merge into Minneapolis Gas Light Co., her job is almost over and Wall Street will lose its only woman president of a utility holding company.

A slender woman in her late thirties, Mrs. Seymour looks not at all as you would expect a public utility president to look. In fact, more than one Wall Street baron has arrived for a conference with "the president of American Gas" and been flabbergasted to discover that he is dealing with a pretty woman with smiling Irish eyes, and the look of a Hollywood actress.

Mrs. Seymour assumed the post two weeks after the death of her husband, who had been head of the company. Into his offices at 60 Wall Street she went each day from nine until five and with two telephones, a secretary and the help of "my gang," set-out to solve the many problems confronting the corporation in its recapitalization under laws administered by the Securities and Exchange Commission.

"At first it was frightening," she said, recalling the first board meeting when her hands "were like ice".

"But soon the other directors, all men, got used to the idea of having a woman preside over their meetings and they regarded me as one of them," she says.

Not only was Mrs. Seymour required to preside at American Gas meetings, but she also acted as president of Savannah Gas and St. Augustine Gas Co. and vice president of Bangor Gas Co., subsidiaries of American.

Throughout the recapitalization of American Gas the sale of five of its subsidiaries, Mrs. Seymour has followed each step closely, spending hours in conferences over detail planning. In her mink coat, she is a familiar figure at the long and tedious hearings before the SEC.

Her past business experience as "customers' woman" with the firm of Goodbody & Co., came in handy in solving some of the problems. But now that the task is almost completed, and American Gas is to become the fourth holding company to complete its recapitalization, Mrs. Seymour wistfully recalls that the job "was much more interesting when we were having headaches."

She intends to retire and just serve as a director and vice-president of the new company.

"Perhaps then," she says, "I can take a vacation with my son," five-year-old Richard Warner Seymour.

To Increase Capacity Of Tennessee Gas Line

TO "prevent a serious and prolonged interruption to war production" next winter, the War Production Board has requested Tennessee Gas and Transmission Company to increase the capacity of its new Texas-West Virginia natural gas pipe line 30 per cent by November 1. The line, which was constructed to meet shortages which WPB predicted would develop this winter, is now carrying more than 200,000,000 cubic feet of gas daily to the strategic Appalachian industrial area.

WPB has certified the project to the Defense Plant Corporation as extremely necessary to the war effort, thus making DPC facilities available for financing the construction.

Capacity of the line will be increased by the construction of four compressor stations. The resulting increase in compression will enable the line to carry 60,000,000 additional cubic feet of war-needed natural gas every day. This gas will be obtained from fields other than Stratton-Agua Dulce, the present source of the line's supplies.

Panhandle to Sell Gas In Canada

PANHANDLE Eastern Pipe Line Co. has reached an agreement with the Union Gas Co. of Canada, Ltd., whereby it will supply gas from Texas to southwestern Ontario, if United States authorities approve the transaction. Negotiations between the two companies have been under way for more than a year.

According to the agreement, approximately 5,000,000,000 cubic feet of gas per year will be delivered in varying quantities throughout the off-peak period, from April to November.

The construction of some seventy miles of transmission lines, including a line under the Detroit river connecting the Union lines with the terminus of Panhandle Eastern's line, will be necessary. Compressor plants in Canada will be built. The project will involve expenditures by the Union company of about $3,000,000.

The date when the supply will be available depends on the time required to obtain the necessary export authority from the United States government, and to fix a satisfactory price to be paid by the Canadian company's consumers.

The gas supplied to Union is vitally needed for Canadian war plants as well as for supplying some domestic uses.

Philadelphia Prepares for Postwar Gas Sales

LAYING the groundwork for intensive postwar sales promotion, The Philadelphia Gas Works Company has taken two important steps. First, it has increased its sales staff, creating a new division; second, it has introduced two smart new publications addressed to the plumbers and dealers.

George Mauger has been appointed supervisor of a newly-created plumber division and Harold R. Zeamer heads up the company's dealer division. Mr. Mauger has been associated with the company for 15 years and carried out its prewar program of sales for both appliance dealers and plumbers. Mr. Zeamer went to the Philadelphia utility from the Northern Liberties Gas Company, of which he was superintendent for the past five years. Previously, he was office supervisor of The Philadelphia Gas Works Company's district offices at North Philadelphia and Germantown.

Beginning in January the "Appliance Merchandiser" and "The Merchandising Plumber" made their bow. The former, edited by Mr. Zeamer, is distributed to 500 appliance dealers and furniture stores in Philadelphia. The latter, edited by Mr. Mauger, reaches 700 registered plumbers. While there is a similarity in makeup, copy is keyed to fit the readers. Each is an attractive four-page, illustrated, tabloid-style publication, printed on "slick" paper. Lead story in the first issue of each is "PGW Plans Strong Postwar Dealer Cooperative Plan."

In addition to news of gas appliance and merchandising developments, it is planned to include reprints of American Gas Association national advertisements, as well as local ads.

H. S. Christman is sales manager and F. H. Trembly, Jr., is assistant sales manager.

A Kitchen To End All Kitchens

The kitchen above, lampooning the postwar visionaries represented in too many of today's advertisements, is the product of the fertile imagination of S. A. Mullikin, manager of sales and advertising of The Schaible Co., Cincinnati, who however, refers all inquiries to Utopia Products, Inc., 7 Heaven-Can-Wait Street, Show Me 1, Missouri. It has struck a responsive chord and brought thousands of requests for the folder describing it. Here are a few features of the Postwar Faucet Kitchen: Everything automatic, run by electronic controls (No. 1) in operator's booth. Everything in easy reach of Giant Whirling Faucet Unit (2). Floor, no longer of use, becomes Giant Cup-Strainer (3). For kitchen-swimming, drop cup-strainer floor, fill kitchen with water, snap diving board (4) in place. Escalator (5) to operator's booth. Multi-use flit gun (6) controls various pests, including persistent salesmen. Mood-control keyboard (7) creates any frame of mind desired. Self-rocking rocket cradle (8) for streamlined baby of "tomorrow" (9). Conveyor belt (10) with "meals of tomorrow" and newly designed "plates of tomorrow" on way from shelf to places at uncomfortable "seats of tomorrow". Place (11) for a few kitchen antiques saved for sentimental reasons. Mechanical "reachers" (12), for performing one or two little kitchen details not quite perfected yet for automatic operation by electronics. 105 millimeter twin-spouts (13) made of glass. Streamlined sinks (14) put in just to help room look a little like a kitchen. Sinks completely useless otherwise. Packaged powdered dust (15) that turns into pre-dehydrated food. Shows "seeds" for a year's supply of food. "Flowers of tomorrow" (16) show influence of streamlining. Chemical garden (17) "raises" pre-dehydrated fruits, vegetables and fish. Hopper just below it sifts food from chemicals, fast-freezes it, and makes it into capsule meals. Electronic stove burners (18) for old-fashioned people wanting occasional hot meal. Windows (19) with one-way vision for privacy. Neighbor's house built around kitchen like this (20). And so forth, etc., etc., etc. Grim, isn't it?

Man's Comfort Was Problem Centuries Ago

JAMES S. JANSSEN of New Orleans Public Service Inc. throws more light on the origin of modern air conditioning in the following communication:

"There appears in the January, 1945, issue of the A. G. A. MONTHLY an article entitled 'Air Conditioning a Century Ago.' May I submit that this is a comparatively recent development in man's attempt at reducing temperatures for his use and comfort, and that a previous successful attempt had been made centuries before.

"In Alfred the Great's 9th century version of Orosius' 'History of the World,' which was originally written early in the 5th century, he includes an account of the travels of two men known as Ohthere and Wulfstan. In a section known as Estland, thought to be Estonia, they encountered a people who were able to produce cold sufficient to preserve bodies or to cool drinks.

"A literal translation by Marion Janssen of Tulane University from the Old English (Early West Saxon), in which this passage was written, runs thus: 'And there is among the people of Estland, a tribe, that they can make cold; and by means of this, there the dead men lie so long and do not decay since they make the cold in them. And although men set two vessels of ale or water, they make that either is frozen over, whether it be summer or winter.'

"Unfortunately, the method used must have been a closely guarded trade secret, for no further details of the process are recorded."

Spotlight

● Following publication in the January A. G. A. MONTHLY of the "Charge to Ancient Supplers," expressing the lofty ideals behind the conception of the Gild of Ancient Supplers, Mayor C. Edwin Bartlett has been forced to accept the penalty of fame and lead a model existence, lest he be held up to public ridicule. Being somewhat concerned that this condition might lead indefinitely to a monastical existence, devoid of all frills and frolics, the Mayor has written to disclaim authorship of the charge:

"Since publication of the charge to new Supplers, I seem to hear the distant, but increasing baying of the bloodhounds of the sinful and sordid trying to catch us of the Gild in a violation of our ideals.

"The more serious aspect of the danger is that instead of their pursuit of the entire Gild membership, severally or jointly, they are sniffing at me principally because of the statement in the MONTHLY that I was the composer of the charge.

"This letter then is just for the record and to disclaim my personal blame for the work of an inspired committee."

Supreme Court Halts Refund to Gas Users

A FIVE-TO-FOUR Supreme Court decision Feb. 12 halted a $25,708 refund to gas consumers in four Iowa communities, but left them opportunity to sue for it in state courts.

The ruling was protested by Justice Hugo L. Black as defeating the purpose of Congress in passing the natural gas act "to prevent ultimate consumers of gas from excessive prices."

The court set aside an order of the Seventh United States Circuit Court which had directed that the money should go to the city treasurers of Muscatine, Greenfield, Knoxville and Pella, Iowa. It had rejected claims of Central States Electric Co. to the fund, but left it free to seek adjustment with the cities. Central appealed.

The court lacked jurisdiction to settle the question of consumers' rights, the majority opinion said. It directed that the money be paid to Central unless other claimants bring suit in the proper court within a reasonable time.

The sum accumulated during litigation over an order directing a reduction in wholesale rates by Natural Gas Pipeline Co., which served Central. The order was made final after three years in court.

Justice Black, with Justices Frank Murphy and Wiley B. Rutledge concurring, noted that during the three years the Iowa consumers were deprived of the right to get a rate cut through their local regulatory agencies because the Federal order was stayed during that period.

The majority opinion, written by Justice Owen J. Roberts with Justices Stanley F. Reed, Felix Frankfurter, Harlan F. Stone and Robert H. Jackson concurring, agreed that the gas act is intended to protect the ultimate consumer. However, it was left to the states to regulate intrastate distribution and sale, it pointed out.

Justice William O. Douglas wrote a separate dissenting opinion.—*Associated Press.*

When LaFayette passed through Fredonia, New York, in 1824, the village inn was lighted by natural gas.

Gas Measurement Short Course Gets "Go-Ahead" Signal

THE War Committee on Conventions of the Office of Defense Transportation has reviewed the past activities of the Southwestern Gas Measurement Short Course and has ruled that it does not come within the scope of the government restrictions on conventions. The ruling was made because the short course can in no way be considered a convention, but is a regularly scheduled educational project of the College of Engineering, University of Oklahoma.

Because of travel difficulties and other war-time conditions, the General Committee of the short course cancelled the 1943 school and did not plan to hold another for the duration of the war. The omission of the course during that year was felt keenly by those engaged in gas measurement and related work. This was especially true of new employees who did not have an opportunity to receive the specialized training offered during the course. Older employees also missed the schooling opportunities presented through this educational project.

During 1944 demand for the course became so great that the committee gave its approval and the 19th annual Southwestern Gas Measurement Short Course was held in June of that year. The final registration figure was 524 with those in attendance ranging from metermen to company executives. A number of officers of the armed forces who are charged with the responsibility of gas measurement and distribution registered for the course.

Since both the demand and necessity for a short course in 1945 is equally as great, the committee has set April 17, 18, and 19 as the dates for this year's school.

Gas measurement course committee in session. Left to right; standing: George E. Greiner, W. R. McLaughlin, E. L. Stark, E. C. McAninch, James L. Griffin, C. E. Terrell, J. H. Satterwhite, B. F. Worley, and Gilbert Estill. Sitting: W. H. Woods, Earl Kightlinger, C. A. Gibson, R. M. Scofield, W. H. Carson, and Kate A. Niblack

Long Service Records Established

New England Power Association President Irwin L. Moore presents service pins to Lawrence Gas and Electric Company's President and Agent, Fred H. Sargent and Assistant Treasurer, Frederick C. Harmon, at a recent luncheon at the Harvard Club of Boston

SETTING up service records seldom equalled, Fred H. Sargent, president, and Frederick C. Harmon, assistant treasurer of the Lawrence Gas and Electric Co., recently completed 55 and 50 years respectively of association with that company.

Mr. Sargent was born in Lawrence, August 19, 1871, and attended the public schools in that city. After leaving Lawrence High School, he entered the employ of the Lawrence Gas and Electric Co. as a clerk in the gas plant. In 1895 he was made manager of the Commercial Department, in which position he remained until he was appointed superintendent of the Gas Department in 1898. Six years later he was appointed general superintendent of both the Gas and Electric Departments.

In 1919, he was elected agent by the Board of Directors and one year later was appointed vice-president. On February 3, 1927, he was made president and agent of the Lawrence Gas and Electric Company, a position which he holds at the present time.

Always active in community and civic life, he has been associated with many local organizations and for years has retained membership in the Society of Gas Lighting Engineers, the Guild of Gas Managers, the New England Gas Association, the Essex County Electrical Club, the Chamber of Commerce of Lawrence, and the Rotary Club.

Mr. Harmon is a native of Lawrence and joined the personnel of the Lawrence Gas Company in November, 1894. He was assigned to the Meter Department, but soon transferred to the office. In various capacities, Mr. Harmon obtained diversified experience in office work, which proved invaluable later. In 1918, he was promoted to the responsible position of assistant treasurer by the late C. J. R. Humphreys, then president.

Oregon Gas Utility Sets New Records

MORE customers used more gas during 1944 than in any of the 85 years of Portland Gas & Coke Company's history.

Customer total reached 104,452 and gas consumption climbed above the six billion cubic feet mark—6,248,702,000 to be exact. or a gain of 5.5 per cent over 1943. The customer gain over 1943 was an even 5 per cent with 4450 new customers.

Total payroll for the year was $1,927,000, an increase of 7.5 per cent over 1943. Average number of persons on the payroll was 700.

Production bureau set an all-time record for a single month's gas send-out by meeting demands for 826,374,000 cubic feet during December, the month of cold east winds. The previous high month was January of 1943 when 821,761,000 cubic feet were sent out.

Gasco briquets also reached a new high during 1944 with total sales of 94,562 tons, an increase of 2,962 over 1942, the previous record year.

Repressuring Begun

BRITISH-American Oil Co. has commenced operation of its repressuring plant in South Turner Valley, according to reports from Calgary, Alta. Low-pressure gas is being gathered from the southern part of the field, processed and either marketed for fuel or returned to the formations.

Helium Uses Multiply

WITH the increased use of helium gas for welding magnesium and aluminum-magnesium alloys in aircraft plants and for many other industrial and scientific purposes, the Bureau of Mines last year shipped more than twice as much of this lightweight, noninflammable gas to commercial distributors as it did in 1943, Secretary of the Interior Harold L. Ickes announced Feb. 15.

A total of 2,187,205 cubic feet of helium went to commercial distributors from Bureau of Mines producing plants in the 1944 fiscal year, as compared with 1,059,655 cubic feet the previous year, the Secretary revealed. In addition, many other millions of feet were earmarked for the Navy's antisubmarine blimps, for the Army and for Weather Bureau meteorological balloons, with the Bureau of Mines more than meeting all the requirements of these agencies.

Last year's commercial or non-military shipments from the Bureau's plans in the southwest were nearly 30 times as large as those of the prewar year of 1938, and Secretary Ickes assured users of helium that more and more will be available for non-military purposes in 1945.

There are many newly developed industrial uses for helium, one of the most important being in the welding of magnesium and its alloys in aircraft plants where the welding process is shielded by inert helium gas to cool the metal, control its inflammability, and improve the strength and quality of the weld.

For years medical and scientific groups have experimented with helium in the treatment of respiratory diseases, for mixing in hospital anesthetics to prevent fires and explosions, and in alleviating or eliminating caisson disease, or "the bends," and large quantities of helium are used in this field, both in research and in practical application of methods already perfected.

Today the Bureau of Mines is producing helium at a rate more than 25 times that of the prewar days, and can increase its output on a few hours notice.

Introducing "The Flame Family"

THE Pacific Coast Gas Association, for the 17th consecutive year, is representing a number of its gas company members in conducting an advertising and publicity campaign in behalf of gas fuel.

Advertisements appear regularly in five consumer magazines, two retail dealer magazines, and 12 journals reaching major professions and industries. The 1945 budget is $46,600; Knollin Advertising Agency, San Francisco, is handling the account.

First of a new series of full-page ads in consumer magazines introduces "The Flame Family" whose appealing "quints" are "Speedy, Cleany, Steady, Flexy and Thrifty." Second insertion, illustrated here, shows a young woman musing over a book of home plans. From its pages spring the five flame-like elves to help her. Starting with the third advertisement, one of the five "good gremlins" will be featured each month, with illustrations and subsidiary text on the other four.

Second advertisement in the striking new series sponsored by the Pacific Coast Gas Association

Kitson Company Wins Army-Navy "E" Award

Officiating at the presentation ceremony, Philadelphia, February 13, left to right—Rear Admiral Wat T. Cluverius, U.S.N. (Ret.); Lieut. Colonel Hayward K. Kelley; John E. Hopkins, Foundry; Edward Loges; Lieut. Gerald F. Welles; and President Morse DellPlain

Gas Difficulties in France

FAR-REACHING restrictions have had to be imposed on the Paris population during these past days. Among them has been the closing down of gas supply at 8:30 in the evening until two o'clock in the morning. The reason why supply is resumed early in the morning is to enable bakeries using gas to bake their bread. Only at this time is the pressure complete, during the rest of the day pressure is reduced.

Stocks have not been built up because it has been impossible to bring coal over a battlefield. On top of this, winter is proving itself to be a hard one. Transport is difficult, rivers and canals have frozen over so that Paris has been receiving from 6,000 to 8,000 tons of coal per day instead of the 20,000 tons needed to meet all requirements.

Coal production in France is satisfactory and it is transport to the gas plants that is the difficulty. Production is not less than 75 per cent of what it was in 1943, which can be regarded as very good. Stocks of coal are piling up in the north because at present they cannot be shifted to Paris.

Before the war French coal consumption for all purpose amounted to 5,300,000 tons per month. National production amounted to 3,392,000 tons and the deficit was made up by imports. At the beginning of 1944 total production per month was 2,789,000. In May, 1944, it dropped to 1,605,000 tons, rose to 1,833,000 tons in December and today stands at 2,280,000 tons.

The restrictions of the past week or so, however, have not had the desired effects expected. The cutting off of gas supply in the evenings only reduced consumption by 18,000 cubic metres out of a total of 1,600,000 cubic metres.

At one time there were coal reserves for only two days' gas in Paris, but fortunately, the thaw set in and the flow of coal immediately increased. (*The Gas World*, London.)

Gas cooking was making its first appearance in the United States in 1879 when the American Meter Company sent a representative "to select and import for them the best makes of French and English gas cooking stoves adapted for use in the United States."

Proceedings

Because of the limitation of storage space, copies of the American Gas Association Proceedings from 1923 to 1940 inclusive, and Natural Gas Proceedings from 1922 to 1940 inclusive, will be sold to members of the American Gas Association as long as the supply lasts at $1.00 per copy. This is an opportunity to supply missing issues to complete files. Address orders to Headquarters referring to this offer.

SELLING COMMERCIAL COOKING EQUIPMENT

(Continued from page 118)

profitable business, and that they are losing a considerable sales volume and profit by not aggressively going after this business. In some of the larger cities, it is quite possible that dealers can set up separate sales departments for the exclusive selling of gas cooking appliances. The past methods must be changed so that the dealers will *sell* the appliances, rather than having the customer buy them.

This entire problem of selling gas commercial cooking appliances is one that requires the best thinking of the managements of the gas companies, the manufacturers and the dealers. There is no reason why a definite selling plan cannot be formulated which will include all of these suggestions above, and undoubtedly many more changes will come to mind as the program is formulated.

The inescapable fact is, that if the gas company hopes to retain its commercial cooking load in the face of the competition it will have to meet in the postwar era, a much more aggressive merchandising practice must be followed. As soon as the war is over, we can expect increased activity by competitors in every section of the country and no gas company can longer afford to be satisfied with what before the war was termed commercial cooking appliance selling methods. It is a question of setting up a plan now and having it in complete readiness to put into operation the moment present restrictions are lifted. To do anything short of this is inviting disaster.

Convention Calendar

MARCH

6 •A. G. A. Southwest Personnel Conference, Shreveport, La.

8 •A. G. A. Midwest Personnel Conference, Phillips Hotel, Kansas City.

APRIL

17-19 •Southwestern Gas Measurement Short Course, Norman, Okla.

MAY

7-11 •National Fire Protection Association, Annual Meeting, Palmer House, Chicago, Ill.

JUNE

12-14 •Institution of Gas Engineers, Annual Meeting, London, England.

19-22 •Canadian Gas Association, Annual Convention, Murray Bay, Quebec.

Accounting Section

Functional Accounting

BY L. E. REYNOLDS

Auditor and Assistant Treasurer, The Connecticut Light & Power Co., Hartford; Coordinator, A. G. A. General Accounting Activities Group

L. E. Reynolds

MUCH has been said and heard in the past few years of "Functional Accounting," yet it is a subject about which little has as yet been written. It was one of the subjects on the agenda at the General Accounting panel session of the 1944 Joint Spring Conference of Industry Accountants in Cleveland, and created a great deal of interest there. No definition of the term appears in the American Institute of Accountants' "Accounting Terminology," but a simple system used for a number of years by The Connecticut Light and Power Company to control operating and maintenance expenses in the field seems to meet all the fundamental requisites of functional accounting which have so far been developed.

What Is Functional Accounting?

I am familiar with one or two accounting control systems which appear to fall within the accepted standards of functional accounting. I shall try to explain first what I think the term implies, then describe briefly what is being done at The Connecticut Light and Power Company, and also discuss another method.

What, then, is functional accounting? One of its advocates, L. P. Spacek of Arthur Andersen Company, in a talk before the American Gas Association and Edison Electric Institute at Chicago in December 1940, defined it as follows: "It is a system under which the field organization reports its activities to the accounting department by use of predetermined standard descriptions of such activities, without attempting to determine the account to which the activity is chargeable under the uniform system of accounts." My personal definition would be—"a system by which the activities in the field are grouped *for report purposes* under predetermined standard descriptions without regard for the uniform system of accounts."

The difference between these two definitions is this—in the first case, the field reports its activities without regard to the uniform system of accounts; under my personal definition the field could report in accordance with the uniform system of accounts or by some subdivision of accounts; but, in either case, the general accounting department groups the information received into its predetermined function. For example, under Mr. Spacek's definition, the account "Removing and Resetting Meters" might be broken down into: installing meters, removing meters; changing meters; miscellaneous work in connection with meter installation; standardization and miscellaneous, and would be so reported by the field, without regard to the uniform system of accounts. It would be the duty of the accounting department to classify the information so received into the proper function and also keep the records in accordance with the uniform system of accounts. Under my definition the field would send in reports in accordance with the uniform system of accounts or some breakdown thereof, and the accounting department would then classify by functions as I shall later describe.

To put it simply and briefly, functional accounting is just another species of the well-known cost accounting. The primary purpose is to eliminate analyses of individual accounts by showing costs in a simple and easily understood manner. Most of us are familiar with work order accounting. Functional accounting may also be said to be another system of work orders, but instead of work order numbers, titles and code numbers are used.

Disadvantages of Making Reports by Prescribed Classification of Account

The uniform system of accounts provides some subdivisions of expenses according to function, but from a report prepared in accordance with the uniform system of accounts, indicating the charges to individual accounts, the source of the charges is not determinable without an analysis. Experience proved a report following the classification to be incomplete, as far as control over expenditures was concerned. The answer seemed to be one of reclassification and regrouping by function in the broad sense, so that in making reports to the management there would be some definite explanation each month of the various items, and consequently some control over expenditures without continual analysis of the individual accounts. This brings us to the desirability and the advantages of functional accounting.

Advantages of Functional Accounting

Most reports are designed so that all expenditures are classified by account number or subdivision thereof. Functional accounting permits the presentation to the management of comparisons and summaries of adequate and pertinent information necessary for the intelligent and efficient operation of the business. For example, let us assume a function to be a meter department which has to do with the setting, removing, testing and repairing of gas meters. By making the charges directly to the accounts, as required by the NARUC, labor, material and transportation charges are recorded by account numbers. In order to really find out what is in any individual account, it is necessary to analyze it. The accounts may contain labor, material invoices from outside vendors, or even a bill for the repairing of meters done by an outside contractor. These charges are no more reliable than is the individual at the source who creates them.

I dare say that a meter department employee, working in the shop throughout the day, arbitrarily splits his time at the end of the day based on what he thinks he has done. The same comment applies to material; it is charged out to the accounts for which the men think they are going to use it. In most cases the charges are probably made correctly. However, a comparison of the expenditures for this month against those of last month, or against the same month last year is actually a comparison of an individual's estimate, accurate or otherwise, of the amounts chargeable to a particular account.

In my opinion a far more simple and accurate comparison can be obtained if all the costs of the meter department are controlled by items. That is, use the meter department as the controlling function and segregate the charges for control purposes as between payroll, material issues, stores expense, vehicle expense and miscellaneous vouchers and journal entries. In addition show in the report the number of men employed by the depart-

ment. If you have determined that your meter shop requires ten men to carry on the activities of the department, then the first comparison would seem to be the number of men. If last year you required ten men and this year you require twelve, then it would be up to somebody to explain why two more men are required. If you were to compare the labor this month as against last month and the number of employees remained the same but the labor charges increased, then somebody would explain that the reason for the additional expense within this function is due to (1) longer hours, or (2) increase in rates, or both.

Next you may wish to control and compare the material charges, and I don't believe anyone is particularly interested whether the material was used for repairing, or resetting meters, but what you are probably interested in is the amount of material used by that group. I understand from engineers that the amount of material used is proportionate to the number of men doing the work and, therefore, if you have ten men on the payroll using, for example $100.00 worth of material per month, it is reasonable to expect that if your number of employees increases to twenty and they are performing similar activities, then the amount of material used would increase to $200.00.

Therefore, the relation between employees and material for the current month could be compared with that of last year or last month. Similar comparisons may be made of vehicle charges and number of cars in use.

Connecticut Plan—Control by Source

The question that you probably have foremost in your mind now is—what is The Connecticut Light and Power Company's plan and how is the control exercised? The management of the company first decided what was needed for the control of expenses. For example, for the control of gas expense the following functions were set up: gross gas production; residuals; transmission; distribution; meter; utilization; for operating and maintenance accounts each separately. The breakdown within each function is payroll, material issues, stores expense, vehicle expense, miscellaneous vouchers and journal entries.

Control of operations, under The Connecticut Light and Power Company type of functional accounting, is accomplished as follows: The company classification of accounts is used in the field, from which the personnel determine the proper account to which to report charges on time reports, vehicle reports, material issues, etc. As these reports are received in the general accounting department they are collected, arranged and summarized according to the afore-named functions.

For several years prior to 1941 the so-called "peg strip" method of accounting, with which many are familiar, was employed.

Since 1941 the punched card method of accounting has been used. This method adapts itself particularly to functional accounting and with its use we have been enabled to elaborate the system of accounts and obtain the desired answers to many problems.

Along with this information, for the benefit of those responsible for the control of expenses, the following comparative figures are shown: sales and revenue, book value of materials and supplies on hand by departments—electric, gas, merchandise, etc. In addition there are shown vehicle and stores expense data, average weekly payroll (some months consisting of four weeks and others of five), together with the amount charged to construction, overtime in dollars and hours, the hours paid for and not worked, such as, vacations, holidays, sickness, etc.—number of employees by departments—administrative, office, sales, stores, etc. When the manager receives this report, he doesn't have to check the numerous accounts within the uniform classification—he has before him a condensed picture which contains all the information which enables him to control expenditures in his district.

This outlines briefly what is being done at The Connecticut Light and Power Company and, in my opinion, falls within the category of functional accounting.

Functional accounting cannot be defined too narrowly; it may be one thing in one company and something different in another. Some companies may approach the problem in a different light—they may not want to place emphasis on the breakdown of labor, material, stores, vehicle, etc., but possibly on activities.

Another System—Control by Activity

In another system of functional accounting each account within the uniform classification of accounts is subdivided into whatever activities may be charged to the individual account; that is, functional classifications are really sub-accounts of the Uniform Classification of Accounts. For example, typical functions of regular accounting might be, "Property Accounting," "Merchandising Accounting," "Regular Financial Statements and Books," etc. No attempt is made under this particular system to report charges by labor, material, etc., as described in The Connecticut Light and Power Company's system. Such a detailed system of functional accounts is at present in use by one of the larger combination utilities in the country.

In effect the only difference between this system and that described previously is that in the first case the function is a broad one and the control is by source of charges—labor, material, etc.—whereas, in the detailed system of functional accounting the functions are very much smaller and the control is by *activity* without regard to the source.

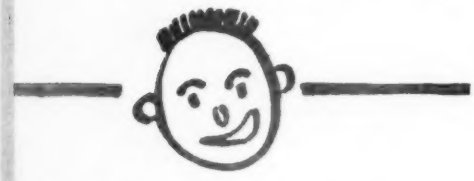
As stated previously, under the first system the field personnel charge to the prescribed account within the Uniform Classification and for report purposes the charges are summarized by function. In the second instance, charges from the field are made to either the code number or to the title and it is entirely possible to use, for example, a printed time report which lists all the functions within a department, so that the employee needs merely to check the functional classification on which he works and indicate the number of hours involved for that particular function. The charges are by activity without regard to the classification of accounts, and *reports* to the management are made by these *activities,* and the activities are converted to the uniform system of accounts for purposes of reporting to regulatory bodies. Essentially the systems are the same, the only difference being in the method of reporting.

I can readily see that in a very large company with a large number of employees within a single area, a more detailed listing of functions might be required, but I can also see a great desire on the part of accountants and perhaps some operating people to go to the other extreme and come up with far more functional items than are really necessary for the control of operations.

Requirements

In general it may be said that the administrative department heads should determine what they need for efficient operation, irrespective of the theoretical accounting requirements. Then the question is—to what degree are the expenses to be broken down? Are they to be set up so that the foremen of the meter department or a line department could be held responsible for a group of expenses, or just what is wanted?

There also must be taken into consideration the number of districts or divisions into which a system *(Continued on page 148)*



I am a happy customer . . . when I am waited on courteously and promptly.

I am a happy customer . . . when I am called by name and my name is correctly pronounced.

I am a happy customer . . . when I receive some extra little service that I didn't expect.

I am a happy customer . . . when I am smiled at so I can smile back.

I am a happy customer . . . when I am treated with eagerness as though my small and modest business was of the utmost importance.

I am a happy customer when my telephone request is recorded with efficiency and I'm not left dangling on a dead line.

I am a happy customer when people listen to my complaints carefully and give me their undivided attention.

and it takes such little effort to keep me happy, it's a wonder more folks don't try

The Gas Flame

Salesman Power Packs a Punch

BY ROY E. WRIGHT

Negea Service Corp., Cambridge, Mass.

Roy E. Wright

THE story of "Salesman Power" is but one phase of Report No. 4 of the A. G. A. Postwar Subcommittee on "Engineering and Economic Phases of the Gas Industry." Other phases pertaining to the economics of selling are:

1. Market studies
2. Evaluation of new business efforts
3. Evaluation of home service
4. Revenue life of appliances
5. Minimum new business expense to hold revenue
6. The effects of aggressive new business efforts versus passive ones on results

All these phases together with Salesman Power should be coordinated into one overall program in the "Economics of Selling."

Obstacles to Progress

The three greatest obstacles in the path of progress in the gas industry are:

1. Tradition
2. Egotism
3. Personal opinion

Because an idea or program is new or has never been tried should not necessarily make it wrong or no good. Because we do not think up the idea or program we should not condemn it to oblivion. Because we think a thing is right or wrong does not necessarily make it so unless we can substantiate our opinion with facts. There are too many decisions being made in the gas business on personal opinion instead of facts.

I am glad to discuss the subject of Salesman Power because we are convinced that adding revenue to the sale of gas appliances is a matter of simple arithmetic

1. The management decides how much revenue it wishes to add through the sale of gas appliances.
2. Knowing the revenue that each appliance will produce and the average number of sales per man, you determine the number of salesmen needed to do the job.
3. You estimate the cost of these salesmen.
4. The management decides how much it can afford to spend to add this revenue.
5. Then you trim your sails to meet the pattern.

(a) If the management reduces your budget for salesmen needed to do the job you reduce the amount of revenue you can add.

(b) Then you go to work.

It is that simple! Provided—and this is important—provided you do a normal sales promotion job. It is not our intention to imply that all you have to do is to increase your salesman power and forget everything else and your sales will increase in direct proportion to the increase in salesman power. It is assumed that

1. The salesmen will be carefully selected.
2. The salesmen will be properly trained.
3. The rates will be comparable.
4. The competitive conditions are normal.
5. The appliances sold meet the market conditions.
6. Reasonable promotional advertising is used.
7. The appliance pricing policy is reasonable.
8. The appliance financing policy is normal and comparable in regard to
   (a) Terms.
   (b) Down payment.
   (c) Finance charge.
9. The installation charge is reasonable.
10. You have a good servicing policy.

It is important, however, to remember that you may have all of these factors but you will not do a good job unless you have proper salesman power. You will find that there is a direct relation between salesman power and the per cent of the total meters that you will sell. If you determine what per cent of your total meters you want to sell an appliance or combination of appliances, divide that number of meters by the average number of sales per salesman-year to determine the number of men needed to do the job. The revenue estimated to be added through the sale of appliances may not show in the operating report. This is due to the fact that most companies lose revenue at the same time that new revenue is being added through the sale of appliances. This particular point has been completely outlined under the evaluation of new business effort.

The average number of sales per salesman-year will vary with business conditions. In good business periods, it will be above average. In poor business periods, it will be below average. As an example, if a given company has 10 salesmen and the average number of sales per salesman-year in that company is 100, then in a normal year those salesmen will sell 1000 units. In a period of good business conditions, those same salesmen might average 125 units per salesman-year. Thus, in a year of good business conditions these 10 salesmen should sell 1250 units. In a poor business period, the average sales for these same salesmen may only be 75 units per salesman-year. Thus, in a year of poor business conditions these same 10 salesmen should sell 750 units per salesman-year. If, however, the company in a poor business year cuts this salesman force to 5 salesmen, as many companies are wont to do, then these 5 salesmen would only sell 375 units during a poor business year rather than 750 units. This is borne out by the fact that, with the same number of salesmen over a period of years, the sales results will vary from year to year. Likewise, for the same reason the sales curve will not exactly parallel the salesman-power curve.

Converted by Facts

I have a confession to make. I did not always believe in the philosophy that sales results were in proportion to salesman power. I am a convert. Converted by the facts found from studies made from our own experience and that of other companies. In 1939, we doubled our salesman power. I did it with my fingers crossed. I am sure that our local sales managers were skeptical of the expected results. After three years of experience, a study of our results was very convincing. Our sales increased in proportion to our salesman power.

So I come to you to repeat the conclusions found from studies made for and recorded in the report on the Economics of Sales. Do you agree or not? Let us take them individually and see.

1. Sales results, that is units sold and Estimated Annual Revenue added are in proportion to the number of salesman-years.
2. The amount of estimated revenue obtained per salesman-year is approximately the same (in a given company) whether a salesman is assigned to 1500 or 8000 customers.

3. The fewer meters per salesman the larger is the amount of estimated annual revenue that can be realized per meter.

4. The fewer the meters per salesman the lower will be the new business costs per dollar per estimated revenue added.

5. The best results, that is E.A.R. per customer and lowest costs per dollar E.A.R., can be obtained with less than 2000 meters per domestic salesman and the same pertains to heating.

6. Sales results can be budgeted in relation to salesman power.

7. Salesman power is the one positive measurable force in an economical sales program.

It is usually at this point where someone asks the $64 question. "What is the minimum number of meters that a salesman should have." That is a trick question. The right answer is, "I don't know." If you continually increase your salesman power and thereby decrease the number of meters per salesman, you will eventually reach a point of diminishing returns. Where that point is we do not know because to our knowledge no company has ever reached it. Before the war in some of our companies we had a domestic salesman for each 1500 meters plus a house heating salesman for each 2000 meters. I am told that at one time a Cities Service Company had a salesman for each 300 meters, but I cannot substantiate that claim. In our case the sales results per salesman were just as good with 1500 meters per salesman as when we used to have 8000 meters per salesman.

Replacement Market Large

A study made in a certain city before the war showed that there was an electric dealer or an electric dealer salesman for every 90 electric meters. A Government agency reports that there are 34 million cooking stoves of all types and kinds in this country at the present time. It further states that 17 million or 50 per cent of these stoves should be replaced now. Who is going to sell these stoves? Certainly they will not be sold the first year after the war because they will not be available. It is, however, fair to assume that they will be sold during the first 5 years after the war. Will these stoves be gas, electricity, coal or oil? The fuel that has the greatest contact with the public will obtain the greatest percentage of these new stoves. You may well ask, "what about advertising?" Advertising is fine. I am all for it but advertising is designed to create a desire. Someone still has to tell a story and sign up the customer. In addition our competitors can and do out-advertise us many times.

I would like to interject here two points. First, if you double your salesman power you will *not* double your new business expense. The phase of the report on the "Minimum New Business Expense to Hold Revenues" shows that the cost to hold business averages $1 per year per customer. This is a fixed expense. Therefore, only that new business cost above a dollar per customer can be charged against obtaining new business. Second, what about dealers and their salesmen? Their production efforts should, of course, be included in setting up your program but remember, there are dealers and

Automatic gas clothes dryer built by the Hamilton Manufacturing Co. which will be sold after the war. It damp-dries the average washer load of clothes in 15 to 25 minutes

dealers. The dealers who only sell a gas appliance when a customer comes in and takes it away from him can be written off as a blank. The results of an active dealer and his salesmen should be analyzed and included in your program. The dealer sales per salesmen-year will probably be less than your own men. You should determine what it is.

It is hoped that each of you will analyze your own situation in regard to the factors outlined so that you can agree or take exception to the conclusions drawn based on the facts found. This report points out that the studies should be continued in order to get a more over-all sample from which could be drawn a more representative conclusion.

Since then a further study has been made from a questionnaire filled out by the companies representing 80% of the gas meters in New England. It tends to further substantiate the conclusions drawn above. For instance, those companies with a relatively small number of meters per salesman obtain as good or better sales results per salesman as those companies whose salesmen have many times the number of meters per man. Likewise, those companies who definitely increased their salesman power showed proportionally increased sales results. This study also taught us that care should be exercised in an analysis of this kind to include only sales made by outside domestic and house heating salesmen and not to include apartment house sales, U. S. Housing project appliance sales and new building development sales. This study also clearly showed the expansion of gas business in the defense areas due to the war.

Perhaps, therefore, we can agree on the following recommendations:

1. Each company should determine what per cent of total meters that they want to sell an appliance or appliances or amount of revenue that they want to add through the sale of appliances.

2. Each company should determine the average number of appliances per year sold by the salesman.

3. Each company should determine the estimated annual revenue added by the salesman through the sale of these appliances.

4. From the above each company should determine the number of salesmen needed to do the job.

5. Each company should determine the additional cost of these salesmen.

6. Each company should determine the amount of money they can afford to spend to obtain new load through the sale of appliances and trim their sails to meet the pattern.

Then go to work.

I would like to conclude with this prayer. "God grant us the serenity to accept things we cannot change; courage to change the things we can: and wisdom to know the difference."

Servel Sales Clinics Set for March

THE second step in the Servel Salesman Selection Program will begin early in March with a series of special training clinics for gas company personnel. These will be two-day intensive training sessions arranged for the benefit of sales managers, sales supervisors and personnel directors.

At the present time over 100 gas companies, representing 9 million domestic gas meters have registered for these clinics.

Servel, Inc. has adopted the "clinic method" for these training schools only after long and careful study. These courses are based on the principle that the best method of teaching is: (1) *Tell the student how to do it,* (2) *Show the student how to do it,* (3) *Let the student do it and* (4) *Let the student do it and tell the instructor why he is doing it.*

The first phase of the clinics is devoted to "telling the student how to do it." The next step shows him how to do it by means of two sound slide films. One film includes examples of all the bad habits that an interviewer might exhibit while the other film shows the correct method, had the interviewer gathered complete information by using the Patterned Interview.

The second day of the school will be devoted to a discussion of the Patterned Interview findings. This is followed with a practice session during which time each student will be given an opportunity to interview a number of "applicants" for gas appliance sales jobs. After each interview the Servel instructor will review the student trainer's technique for specific help and criticism.

The training clinic is then closed with a short presentation on how to recruit men for gas appliance sales work.

Registrations for these clinics should be addressed to R. E. Williams, Chairman, Committee on Selection and Training of Domestic Sales Personnel, American Gas Association, 420 Lexington Avenue, New York 17, N. Y. or to any regional office of Servel, Inc.

Royal Complaint

QUEEN ELIZABETH inspected a kitchen exhibit Feb. 9 in London and peeped inside a plastic coke bin on a prefabricated heating unit. "Oh," she exclaimed, "No coal! Just like most houses now." Then she observed, "My goodness, it has been cold in Buckingham Palace."

Conclude Salesman Presentation Meetings

BY J. H. WARDEN

Chairman, Residential Gas Section, American Gas Association

TEN—*One Thousand—Twelve Thousand*—these are the figures and while figures do not lie, they also do not tell the complete story of the new Salesman Selection Program.

But when applied to ten meetings attended by over 1,000 people and a troupe traveling over some 12,000 miles in order to take these meetings into every region of the United States, you have the story—a statistical story of the regional A. G. A. meetings held under the sponsorship of the Committee on the Selection and Training of Sales Personnel, whose chairman is R. E. Williams of Binghamton, New York.

The last of the ten meetings has just been concluded in Los Angeles after two previous meetings were held on the west coast, one in Portland and the other in San Francisco.

The universal interest in the program and enthusiasm for the manner in which it was presented is conclusive proof that the subject was timely and well presen

From an Association standpoint, they were of special interest as a pattern for presenting information to the gas industry. These regional meetings enabled more than 1,000 members of the industry who were interested in the selecting and training of sales personnel to obtain first-hand information on the subject.

When it is realized that when, as generall is the case, a committee holds a meeting in some centralized location, it is able to present its program to from twenty-five to fifty members of the industry, it can easily be seen how much more effective regional meetings really are.

This is the first time, according to information available, that a committee of the Residential Gas Section of the American Gas Association has taken its program directly to the industry through regional meetings. The enthusiasm with which these meetings were received and the many expressions of appreciation by people at every meeting was convincing proof that this is the method to most effectively present committee programs.

Presentations of this type requires sacrifices in time and effort on the part of those who make them, but it was the unanimous opinion of those taking part in the meetings that the results more than justified the effort.

In addition to the excellent work done by Mr. Williams and his committee, it was the wholehearted cooperation of Servel, Inc. which made these meetings possible. Servel, Inc., unselfishly made its Salesman Selection Program available without cost to the gas industry and then furnished trained personnel to help conduct the meetings and make the presentations effective. This has been a distinct contribution to the future welfare of the industry.

Ten meetings, one thousand people, and twelve thousand miles give the statistical data on the regional meetings, but there is no question that the statistical record of the future sales results of the industry will be much more impressive because these meetings were taken to the industry.

O. R. Doerr, president of the Pacific Coast Gas Association, presiding at the San Francisco sales presentation meeting

Los Angeles Salesmen's Selection presentation held in Southern California Gas Co.'s auditorium

Group of key men at the Portland sales training conference. Left to right: R. G. Barnett, vice-president, Portland Gas & Coke Co.; Carroll Miller, San Francisco; Dr. Robert N. McMurry, Servel sales training consultant; R. J. Canniff, Servel, Inc.; R. E. Williams, chairman, A. G. A. Committee on Salesman Training and Selection; C. W. Steele and Fred Kimball, Portland

HOME SERVICE WORKSHOPS CANCELLED

Home Service Regional Workshops, planned by the A. G. A. Home Service Committee for presentation this spring, have been cancelled as a result of the ban on meetings of 50 or more people.

A two-day meeting of the general Home Service Committee for discussion of other 1945 projects will be held in Chicago in March.

Boys Invade Culinary Field

Mrs. Avalon Bollinger, teacher of home economics at the John Marshall High School, Los Angeles, has a rapt audience as she demonstrates a step in the piemakers' art. Introduced two years ago as a novel experiment, all-boy cooking classes have been so popular there is now a waiting list! The classroom is equipped with gas ranges and instruction is largely by the project method. The boys bake pies and cakes, mix salads and cook other dishes. Last year Mrs. Bollinger's class participated in a school canning contest, partially sponsored by the gas company, and several members won prizes

Holds Furniture Stores "Naturals" for Appliances

THE public has learned a lesson in the value of quality appliances during wartime, when service was hard to get, reports "Retailing," quoting Ward R. Schafer, general sales manager, Edison General Electric Appliance Co., Chicago. "Established merchants, especially those in central locations with newspaper advertising to tie in with national advertising, will sell a greater percentage of kitchen appliances than ever before, because new emphasis has been placed on continued product service. Furniture dealers who have been known as the leaders in using dramatic merchandising ideas, will lead the way in the sale of complete kitchens. They probably will become known as the 'complete kitchen headquarters in their communities.' "

In future selling, the closing emphasis will be on installation with an increasing percentage of appliances being "built-in." Most of the sales will be replacements of earlier models of mechanical appliances. Because of that, a considerable skill in describing intangibles would be required of the individual salesman. In selling a "replacement refrigerator," the contrast between new and old will not be as obvious as when the first sale was made. That situation exemplifies how the complete kitchen display, set up with operating appliances, will be the dominant force in appliance merchandising.

Complete kitchen displays will fit into other plans of almost every home furnishings store. For example: If a merchant favors a policy of single appliance sales, with another appliance sold when the first was paid for, he would use the kitchen as a dramatic demonstration center. Another might want to sell complete kitchens to be included in remodeling jobs; he, too, would make his sales from the kitchen center in his store. The complete operating kitchen display can be used for appliance merchandising atmosphere; it can be used as an interest center for all kitchenware sales; or it can be used to build the reputation of the store as the community's "complete kitchen headquarters."

Servel Reorganizes Export Activities

SERVEL INC. announces the reorganization of its export activities by the formulation of the International Division, according to George S. Jones, Jr., vice-president in charge of sales.

The new division will be under the direction of A. F. Scharer who has been in charge of Servel's export business since 1929. Headquarters of the International Division of Servel Inc. will be at 51 East 42nd Street, New York 17, New York.

The international division will promote the distribution of a complete line of refrigeration fixtures of allied manufacturers for sale through its world-wide distributing organization, in addition to its own products.

McCall Home Service Contest Announced

COMPETITION among gas utility home service departments for awards in the McCall Magazine Contest has been announced for the fifth consecutive year.

War Bond prizes, ranging from $150 to $25, with plaques and certificates, will be made to the five home service directors of companies in the United States and Canada which submit papers indicating outstanding contributions to the war effort.

Entrants must submit three copies of a report of 2,000 words or less, with one copy of appropriate photographs or illustrative material, covering four classifications; planned wartime program; activities to further better living; accomplishment in attaining these objectives in the period of June 1, 1944 to May 31, 1945; and summary of accomplishments of the average home service worker in this period.

Each report must carry a foreword giving total number of customers on December 31, 1944; brief description of territory served; and number of company offices from which activities are conducted. Small departments may compete on an equal basis with large departments.

The contest period is from June 1, 1944 to May 31, 1945. Entries or requests for information should be addressed to McCalls Magazine Awards, American Gas Association, 420 Lexington Ave., New York 17, N. Y., not later than midnight July 1, 1945.

Directs Home Service at Portland, Maine

Irene E. Kennedy

APPOINTMENT of Mrs. Irene E. Kennedy as director of home service for the Portland Gas Light Company, Portland, Maine, has been announced by John A. Hiller, sales manager of the company. She was formerly assistant home service director of the Hartford Gas Company.

Mrs. Kennedy plans to begin a home service program that will include a telephone and recipe service bureau, home calls on gas appliances, talks and lecture demonstrations for women's organizations, and cooking classes for youngsters.

While in Hartford, she was actively interested in the local War Council and the many phases of its work. She was also a Red Cross nutrition instructor and a member of Hartford's Nutrition Committee. In addition, Mrs. Kennedy acted as nutritionist for Hartford's Rolling Kitchen Unit.

A graduate of the University of Connecticut, she is a member of the American Home Economics Association.

High-Speed Gas Heating Technique

BY FREDERIC O. HESS

President, Selas Corporation of America
Philadelphia, Penn.

Frederic O. Hess

BEFORE we cover the assigned subject it is in order to clarify two points:

In the first place, all our experiences have been with gas firing, and therefore this presentation is restricted to gas firing only.

Secondly, just what is meant by "High-Speed Heating?"

If the heat source is combustion of fuel, heat must obviously be transferred to the object through the skin —or from the outside in, if the object is solid—or from the inside out, or both, if the object is hollow.

Now let us define, for our purposes here, high-speed heating as a heating rate at which we approach the heat absorption capacity of the work piece by approaching destruction of the surface of the work piece—while the underlying portions are considerably below the temperature range at which destruction takes place. Obviously the maximum heating rate for any solid is reached when the surface is destroyed, or materially changed from the desired structure. For example: if metal, which is to be heat-treated, melts on the surface, or if magnesium ignites, or a firebrick on an insulating brick fuses on the surface.

It is also apparent that theoretically all fuel-fired heating, whether fast or slow, involves temperature differentials between the outside and the inside of the object during the heating up cycle—in other words, "non-uniform heating." Further, such non-uniformities are greater with the faster heating speeds. Offhand this sounds rather bad, and not at all desirable in industrial practice. But let us see whether, in this instance, we are once again being deceived by "theory" and "sound."

Chart 1 illustrates a heating curve for a cupro-nickel billet. The upper curve represents the temperature of a thermocouple located ¼" below the surface. The lower curve, the temperature of the thermocouple located in the geometric center of the billet. Both couples being, of course, in the same horizontal plane.

The billet was heated in a vertical position with the heat being applied on the cylindrical surface only and not on the ends. You will please note that after 12 minutes of exposure to the heating source a temperature of 1400° F. is shown on the surface couple, and that in less than 1 minute after the fuel was turned off, the center couple and the surface couple show almost identical temperatures—even though an appreciable difference (decreasing from 300° in the early stages of heating to 200° in the later stages) existed between surface and center during the heating-up period.

Chart 2 represents an identically dimensioned billet of brass heated in the identical manner, with identical fuel consumption, in the identical equipment.

Since both charts are on the same scale it is apparent that considerably less differential existed between the center couple and the surface couple during the entire heating period—and that similar time elapsed after the fuel was shut off until center and surface couple showed the same temperature.

I again call attention to the fact that after 12 minutes heating time the surface couple showed a temperature of 1400° F.

Chart 3 gives the heating curves for a copper billet of identical dimensions and heated under identical conditions. The temperature differential between surface and center is further reduced, but again after 12 minutes have elapsed the surface couple shows 1400° F. temperature.

These three charts furnish an interesting confirmation of the different conductivity for the three different metals. The higher the conductivity the lower the temperature differential, as can be expected. These three charts, however, permit further conclusions, namely: the lower the conductivity of the metal the faster the rate of surface temperature increase at the early stages of the heating process.

Presented before American Society of Mechanical Engineers, Committee on Industrial Furnace & Kilns, Heat Transfer Division, New York, N. Y., November 30, 1944.

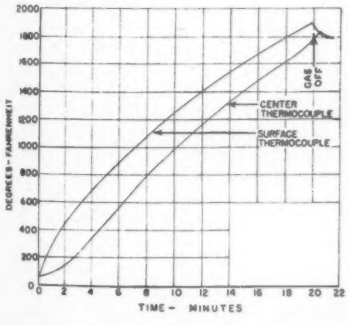


Chart 1. Cupro-nickel billet, 7¾" diameter by 15" long, weight 218 pounds; gas—1200 cu.ft. per hour; air 5400 cu.ft. per hour

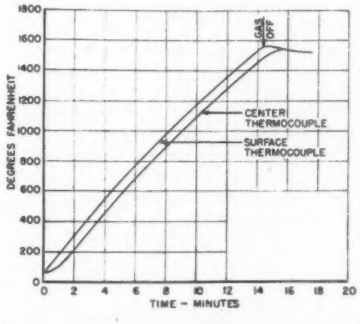


Chart 2. Brass billet, 8" diameter by 15" long; gas—1200 cu.ft. per hour; air—5400 cu.ft. per hour

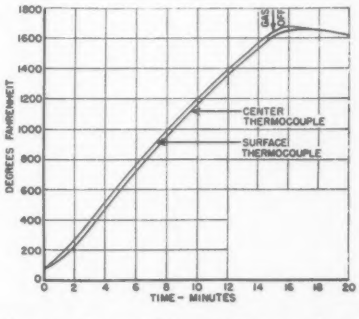


Chart 3. Copper billet, 8" diameter by 15" long, gas—1200 cu.ft. per hour; air—5400 cu.ft. per hour

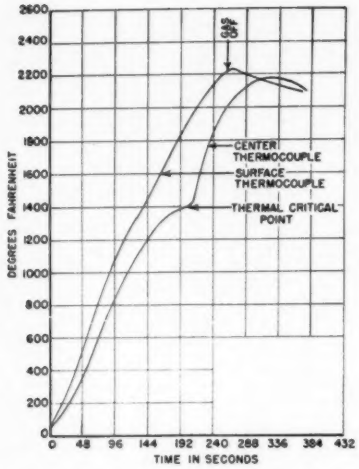


Chart 4. SAE—1095 Steel billet (2¼" x 3" long) gas—560 cu.ft. per hour; air—2600 cu.ft. per hour

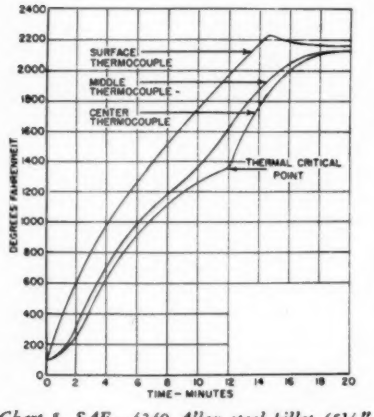


Chart 5. SAE—4340 Alloy steel billet (5½" x 5½" x 10" long); gas—1200 cu.ft. per hour; air—5400 cu.ft. per hour

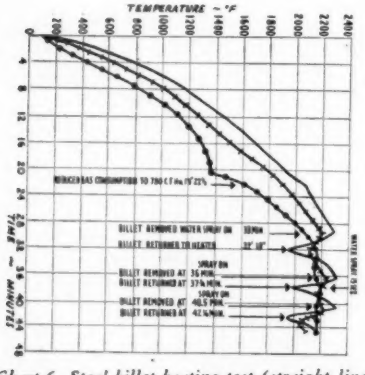


Chart 6. Steel billet heating test (straight line indicates ¼" from billet surface; crossed line ¼" from billet surface; and dotted line, the geometric center.) Billet size 8" x 8" x 12" high; approximate weight, 220 lbs.; maximum heat input 1800 cu.ft. per hour; air for combustion, 8050 cu.ft. per hour

Furthermore, with the heating rates applied in these instances it is difficult to produce a temperature differential of any practical significance between surface and center.

In actual industrial practice, as far as these three particular metals are concerned, the non-uniformity of temperature through the cross-section of the billets at gas shut off or removal from furnace is of little consequence, because of the handling time between heating and actual working, or because of the contact with cool handling fixtures—for example: an extrusion die which easily offsets higher surface temperatures.

But the shorter heating time, which is shown in these curves, is materially less than is now conventional in industry, means shorter furnaces, less work in process and metallurgically less oxidation or scale.

If we transfer these heating rates into smaller objects the temperature differentials become even more insignificant. Thin strips of copper or brass heated at such rates will obviously not show a temperature differential even measurable in fractions of degrees—certainly not as far as metallurgical effects are concerned. Bar stock or slugs tested up to 1" diameter show uniform grain structure throughout after such rapid heating cycles as 30 seconds from cold to full temperature for 1" diameter bronze bars. As far as non-ferrous metals are concerned high-speed heating lends itself and promotes continuous heat treatment rather than batch operation.

Now some heating curves and heating effects upon steel:

Heating Steel Billet

Chart 4 illustrates the heating curve for a SAE 1095 steel billet 2¼" square—again heated only from the outside surface and not from the ends. The rapidity of heat transfer becomes evident by noting that the total time required to bring this billet to 2300° was approximately 288 seconds, or at a rate of 2.4 minutes per inch thickness.

Chart 5 illustrates the heating curves for a SAE 4340 steel billet 5½" square, and in this case the center curve has been added, showing the temperature at a point between the surface couple and the center couple. In this case the heating rate is equivalent to 3.64 minutes per inch thickness.

Both these curves clearly show that under our measuring conditions with a millivoltmeter at 10 second intervals, the surface couple did not indicate the thermal critical point, while the interior points of the billets clearly showed the thermal critical point. Whether this is due to instrumentation, or due to the fact that the heat absorption capacity of the surface is so great that the thermal critical interval disappears, while in the center the slower heating rate makes it measurable, has not as yet been determined—but at any rate the slower heating rate is responsible for the center readings.

The billets exposed to these heating cycles were carefully checked for internal cracking, and no evidence could be found. The surface has been checked and the extent of decarburization was determined at approximately .001 of one inch. The extent of surface scale at approximately .001 to .002 of one inch.

If you recall the previous heating curves it is apparent that in steel a greater temperature differential exists between surface and center, but at such heating rates even this differential is substantially minimized for thin sections, and such sections can therefore be rapidly heat-treated without detrimental effects. For example: steel tubing can be annealed with this technique, and even stainless steel tubing is being annealed with a total furnace exposure time of 10 seconds. Strip heat treatment becomes a practical possibility on a continuous basis, and one of the first applications has been to the fusion of electrolytically deposited tin in the continuous tin strip process. In this case a 6 ft. long heating section raises the temperature of the electrolytic tin and the steel sheet to 525° and fuses the tin to the steel surface, at a production speed of 600 feet per minute—or during a total exposure time of .6 to 1 second.

Temperature Differential

The problem of temperature differential or non-uniformity on heavy sections plays a more important role, but again the question of time between heating and processing, such as rolling or fabricating, or forging, or quenching, must be considered.

At any rate differential heating permits surface hardening of steels, and this process is now being successfully applied to gears, shafts, tank grousers, railroad rails, bearing races, and even larger objects—such as mill rolls. In fact objects weighing as much as 25 tons are now being surface hardened. Another practiced application is localized heat treatment including gradual transition zones.

Differential heating, which in some instances might be undesirable, therefore affords us also new opportunities of heat treatment which were heretofore not available and which have not as yet been fully exploited.

Other possiblities of high-speed heating might also lie in the reheating of billets during processing. A blooming mill billet cools on the surface partially by contact with air and radiation, but also by contact with cold handling equipment.

Chart 6 illustrates a series of tests conducted for the purpose of determining the time required to restore 200° temperature in the surface of an 8" square steel billet. In these laboratory tests the surface was cooled by water spray, and subsequently the billet was reinserted in the hot furnace. Even though the surface cooling effect clearly extended to the thermocouple 1¼" below the billet surface 200° could be restored within the surface within 1 minute's time.

To obtain these heating rates just reported, the gas combustion process had to be accelerated, and the temperature of the heating medium had to be raised beyond the temperature commonly employed. The aim to produce these effects brought about 2 new basic combustion developments, both being based on the use of ceramic materials. Incandescence in the one case is utilized for radiation to the work, and in the other case to accelerate the combustion process. Essentially both these heating elements are com-

plete combustion chambers, and the heating effects produced are controllable and allow also for heat distribution and pattern heating.

Ceramics play an important part in this technique of high-speed heating with gas. The higher temperatures involved are clearly beyond the temperature resistance of any known metal. We will not be able to decide here the scientific controversy whether ceramics have a true or simply an apparent catalytic effect upon the combustion process, but we do state categorically that ceramics are being deliberately and effectively used to produce the results just reported.

It must be clear from these brief statements that the gas technique of high-speed heating is in the pioneer phase. In no instance have we reached the maximum heating rates, clearly not for high conductivity metals, such as copper and brass. Investigations are incomplete and considerable additional research and development work in laboratory and plants will be necessary. In fact it is apparent from the foregoing that our early definition of high-speed heating is inadequate and insufficient.

Research data will eventually provide proper correlation between heat source and temperature and conductivity, and maybe devise a formula for maximum heating rates, or shall we say for maximum absorption capacity under these gas heating techniques. So far a few new heating tools have been produced which will be improved upon, and which undoubtedly will be followed by others. New possibilities in heating rate have been shown, and indications are undeniable that we require a new analysis of heating, metallurgical and process requirements to find the proper field of usefulness for these techniques and to take full advantage of the potentials and the effects.

The influences of conductivity require scrutiny because different alloys will produce different temperature differentials, and therefore affect the rate of penetration. This rate of penetration in turn influences depth of hardness for instance, and it might not be too far-fetched to forecast that conductivity can enter into selection of a steel for a certain product—side by side with carbon content, alloy additions and cost. Alloys are now added for ultimate effects, such as hardness, tensile strength, quenching rates, etc. Why not for heating rates—since they influence heat-treating results? What a pleasant thought for a heat-transfer division, and the specification and metallurgical engineers.

Ammunition Letter on Gas Heat Treating

THE Committee on Heat Treating with Gas, Carl H. Lekberg, Northern Indiana Public Service Co., Hammond, Ind., chairman, on February 20 distributed Ammunition Letter No. 4 to the membership of the A. G. A. Industrial and Commercial Gas Section. It gives a comparison of operating costs between infra-red lamps and convection ovens.

AMERICAN GAS ASSOCIATION

INDUSTRIAL AND COMMERCIAL GAS

ADVERTISING FOR MARCH

The National Advertising Committee of the Industrial and Commercial Gas Section, J. P. Leinroth, chairman, and F. B. Jones, vice-chairman, announces that full page advertisements will appear in the trade and business magazines listed below during the month of March. These advertisements are prepared in cooperation with the Committee on National Advertising as part of the industry's national advertising campaign.

GENERAL BUSINESS AND MANUFACTURING

GAS is fast. BUSINESS WEEK (Mar. 10—⅜ page)

Whether Bunsen or "INFRA-RED" Burner—*GAS* is the Superior Source of Heat. BUSINESS WEEK (Mar. 24—⅜ page)

How *GAS* advances the science of heat treating. MODERN INDUSTRY (Mar.—½ page)

Depend on *GAS* . . . to help win your Post-War goals. INDUSTRIAL HEATING

METALS INDUSTRY

Memo to Mr. Post-War Planner: THE IRON AGE (Mar. 1)

Depend on *GAS* . . . to help win your Post-War goals. METALS AND ALLOYS

How *GAS* advances the science of heat treating. METAL PROGRESS (Mar. 5) • STEEL

CERAMIC INDUSTRY

Southeast's First Vitreous Sanitary Ware Plant Uses *GAS* Exclusively. CERAMIC INDUSTRY

GLASS INDUSTRY

A Powerful Pointer for P.W.P.'s. GLASS INDUSTRY

CHEMICAL FIELD

World's largest producer of penicillin uses *GAS* for important operation. CHEMICAL & METALLURGICAL ENGINEERING

HOTEL AND RESTAURANT FIELD

Owner of Deluxe Restaurant calls *GAS* indispensable. AMERICAN RESTAURANT • RESTAURANT MANAGEMENT

GAS the economical fuel—Let it save for you. HOTEL MANAGEMENT

At University of Pittsburgh *GAS* cooks for Hundreds of Student Soldiers. INSTITUTIONS (2/9 page)

SCHOOL FIELD

Memo to Mr. Post-War Planner: NATION'S SCHOOLS

HOSPITAL FIELD

Memo to Mr. Post-War Planner: MODERN HOSPITAL

FOOD PROCESSING AND MANUFACTURING

New Giant A & P Coffee Roaster uses *GAS*. FOOD INDUSTRIES

BAKING FIELD

Famous 50-year Old Convalescent Home Cooks and Bakes for 300 Guests with *GAS*. BAKERS HELPER (Mar. 10) • BAKERS WEEKLY (Mar. 5)

Can Clinker-Door Lintels Be Permanent?

Figure 1. Conventional type of clinker door lining newly installed

Figure 2. Service condition of conventional clinker-door lining

Figure 3. New water-cooled lintel with silicon carbide jambs

BY J. G. VOELKER

Central Hudson Gas & Electric Corporation, Poughkeepsie, N. Y.

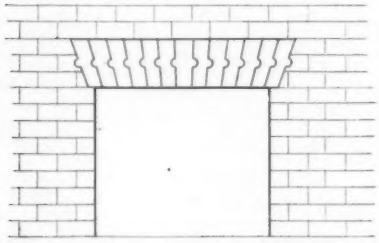
PERHAPS nothing is permanent, except relatively. There is described here a type of clinker-door lintel for water gas generators which lasts so much longer than conventional designs that relatively it seems to be almost permanent.

Our general experience has been that when conventional designs have been used a large proportion of failures in generator linings occur above the clinker doors in the area of the arch brick.

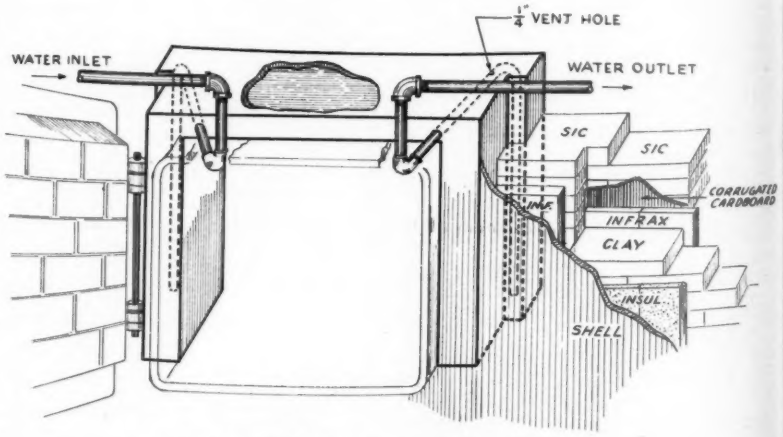
For about a decade, we have used silicon carbide linings in an eleven-foot generator at Poughkeepsie and for a shorter time in other generators in the Central Hudson territory. The design of the refractory pieces used around the doors at first closely paralleled that formerly employed with clay linings where lintel bars and cast-iron door liners were used. This design is shown in Figure I. It never proved satisfactory with any lining used by us. Cracks and breaks in the jambs and arches resulted in dislocations of circle bricks which always developed near the doors and led to lining failures.

The heavy duty imposed on generators by increased set capacity resulting from improved air pressures and other changes has added to the difficulties of maintaining the refractory structure spanning the clinker doors.

Figure II shows the weakness developed in the conventional silicon carbide arch in an eleven-foot generator and the effect of this upon the lining in that vicinity. The service of the wall is impaired by the condition of the support across the door.



Sketch A. Tongued and grooved arch of silicon carbide



Sketch B. Circulation in water-cooled lintel and jambs

Figure 4. Water-cooled lintel with silicon carbide jambs after 11,500 hours of service

Figure 5. Steel-welded water-cooled jambs and lintel unit

Some gain in the stability of the arch was achieved by the tongued-and-grooved design in Sketch A. However, no available design seemed suitable for giving the strength required under the varying thermal and mechanical duties imposed. Consideration was then given to a more durable support for the wall above the doors.

Four years ago we tried a steel-welded water-cooled lintel 2½″ deep and 8″ wide, welded to the shell and extending 4″ beyond each edge of the door frame. This provided a strong beam to carry the load of the superimposed lining. Figures III and IV show this lintel before and after 11,500 hours of service. Except for the supporting jamb bricks which were probably damaged by the cleaning tools, the lining was worn back uniformly at the end of this long period of service.

About 9 months ago an improved steel-welded water-cooled lintel with integral water-cooled supporting columns serving as door jambs was installed in the aforementioned eleven-foot generator. Figures V and VI are photographs of this type of lintel and jambs. No special arch brick are used and the circle brick abutting the water-cooled jambs are simply shaped to interlock with the cool jambs. The saving in the installation cost from omitting the special shapes for arches is considerable.

Circulation of water throughout the vertical elements is indicated by Figure VII and Sketch B which also show the construction features of the lintel and its location in the door. A study of the quantity of water used and the temperature rise of the water through the lintels on all doors of an eleven-foot generator shows that about three million B.t.u.'s are taken away from the generator in 24 hours. Undoubtedly most of this energy comes from the cooling ashes below the active fuel bed. Some of it would have been lost by radiation from uncooled hotter doors. Perhaps steam could be employed for this cooling and reused.

After 7 months of continuous operation, this improved water-cooled lintel appears to be so trouble-free and so substantial in supporting the generator wall that there need be no future failures of generator lining, due to insufficient support of the lining wall above clinker doors. It seems now that relative to the life of a silicon carbide generator lining, the water-cooled lintel and jambs as shown in Sketch B may be considered permanent.

Figure 6. Dry assembly of silicon carbide circle brick around water-cooled jambs and lintel

Figure 7. Cooling water supply to steel-welded lintel

Manufactured Gas Research in Britain

The British gas industry has long been engaged in a program of practical research on gas production. In view of the comprehensive three-year gas industry research and promotional program just launched, an outline of the work of The Gas Research Board in England is of special significance to the American gas industry. Our gas production research program is headed up by the Manufactured Gas Production Research Committee, P. T. Dashiell, chairman. Its longterm objective is "the development of a gas production plant or process of low over-all cost for the manufacture of peak-load gas with particular reference to the house-heating load.

Extracts below are taken from the London **Gas Journal** for December 27, 1944.

IN the early part of the year the Council of The Gas Research Board reviewed in detail a comprehensive program of research, and made certain decisions as to priority of action. The program is a large one, and such priorities must therefore frequently come under review as new developments and new points of urgency arise.

The greater part of the work is being prosecuted in the University of Leeds, under the immediate supervision of the joint assistant director, Dr. F. J. Dent, and the Livesey Professor, D. T. A. Townend. Laboratory accommodation has, however, been obtained at South Kensington by the courtesy of the Governors of the Imperial College of Science and Technology, and a group of workers is being built up there to deal with problems relating to the utilization of gas, while junior staff is also being trained to form a central analytical section. An active centre of research has now developed at Poole in connection with the work being done there on the gasification of coal under pressure.

The research programs upon which it has been possible to concentrate have included those of the previous year on methane synthesis, purification of gases from sulphur compounds, combustion characteristics of gases, distribution of organic sulphur compounds in coal gas, the separation of gases by refrigeration, and the study of radiation and absorption in the infra-red in relation to problems of heating and drying.

To this was added in June the second stage of the research on the gasification of coal in hydrogen under pressure. The intermediate-scale apparatus for this has been completed, and has proved very satisfactory from the operational point of view. Data have since been collected on the effect of scale upon the reactions (on the present scale the charge is 300 lb. coal), and research on the increased scale is now active. The results will eventually indicate the form and shape which the process will take when a pilot plant comes to be built.

Evaluation of the effect of increase of scale is now being undertaken also in the programs of research on methane synthesis and the purification of gases from organic sulphur. While fundamental research on both subjects continues, intermediate-scale apparatus is being constructed. The methane synthesis apparatus is now being built, and it will be capable of treating a number of gas streams, each passing at the rate of 6,000 cu.ft. per day. The intermediate-scale sulphur-purification plant will be housed in one of the works of the Leeds Corporation Gas Department, and will treat 50,000 cu.ft. of gas per day.

The survey of the combustion characteristics of coal gas and the distribution of organic sulphur compounds has proceeded rather slowly for various reasons, but the experience gained will now permit of acceleration: so far, four works have been visited, and data have been obtained regarding 15 types of gas. The observations made are proving of considerable interest, and a number of new facts have emerged.

Separation of gases by refrigeration will probably be a larger factor in gas manufacture in future, and research on this subject and especially on the liquefaction of methane for use as a fuel and for gas enrichment, has been in progress throughout the year. One of the research staff is working on this subject under Professor Sir A. Egerton at the Imperial College.

The researches on the fundamentals of heating and drying by radiation in the infra-red have now reached the stage where it is possible to apply the results to special problems or materials in order to define the best conditions for treatment, and to provide useful information to those concerned with the development of the manufacture of furnaces for specific purposes.

A new program on the purification of liquor effluents has now been prepared. The first problems to receive attention have been the removal of thiocyanates and the solvent extraction of higher tar acids from waste liquors. Several solvents have been found to be applicable to the latter purpose.

An intelligence section has been started, and is dealing with scientific reports and the indexing and filing of abstracts from current scientific literature. It is proposed to circulate to members a series of information circulars on subjects of new interest; the first of these appeared in August, and dealt with "infra-red" heating.

The Abnormality of Flame Gases

REPORT of an arresting study of the abnormality of flame gases by Dr. W. T. David, professor of Civil and Mechanical Engineering at the University of Leeds appeared in the Journal & Proceedings 1944, Vol. 151, No. 3, of The Institution of Mechanical Engineers (London, England), pages 236-245. The article, with four appendices, 17 figures and seven tables, gives valuable data on experiments from which estimates of the latent energy in flame gases may be derived. Introductory statements give the following account of this work:

Hot gases formed as a result of combustion behave differently from normal hot gases of similar composition, and it is believed that a full appreciation of this fact would lead to the opening up of a wide field of profitable research.

Experiments are described in the paper which show that flame gases hold within them a long-lived latent energy. It has been found that the latent energy may amount to as much as, or even more than 15 per cent of the heat of combustion; but it varies greatly with the conditions under which combustion takes place. These conditions have been investigated by means of explosion pressure and heat loss measurements, flame gas temperature measurements, and flame photography.

Experiments are also described which show that in virtue of the latent energy an abnormally large amount of dissociation may obtain in flame gases. On account of this, a platinum wire immersed in flame gases may attain a far higher temperature (some hundreds of degrees Centigrade higher) than a similar wire coated with quartz, and this cannot be accounted for in terms of the different emissivities of the surfaces. There seems little doubt that this phenomenon may have an important bearing upon such problems as the transmission of heat from flame gases and the selection of gas fire radiants.

Production and Chemical Program Laid Out

A MEETING of the joint Production and Chemical Program Committee of the A. G. A. Technical Section was held in New York Tuesday, February 20, to discuss the preparation and distribution of papers originally planned for presentation at the Spring Conference which was cancelled last month. R. Van Vliet, chairman of the Gas Production Committee, and Dr. C. W. Wilson, chairman of the Chemical Committee, conducted the meeting.

To fill the gap created by the conference ban, it was decided to secure a considerable number of papers on timely subjects for publication in the A. G. A. MONTHLY and the gas trade journals. It was recommended that such papers be eligible for the Beal Medal and be made a part of the permanent record by publication in the A. G. A. Proceedings.

Separate meetings of the production and chemical groups were held in the afternoon at which time a schedule of topics and prospective authors was completed.

In addition to the chairmen mentioned above, the following subcommittee chairmen were present: W. R. Fraser, Detroit; R. F. Tenney, Mineola, N. Y.; J. Gordon Sweeney, Brooklyn; C. C. Russell, Kearny, N. J.; J. Hawley Taussig, Philadelphia; F. W. Hartzell, Philadelphia; J. S. Haug, Philadelphia; and Dr. S. P. Burke, New York.

Laboratories

Around the World with A. G. A. Servicemen

BACK home for leave and reassignment after two years of globe trotting as an Air Corps communications officer, Captain C. G. Allen, former A. G. A. Laboratories test engineer, brought back news of several other employees in the armed services. In England he just missed meeting Lt. Frank Hodgdon and David G. Willich. After the invasion of Africa he encountered Capt. Douglas Martin on that continent and flying to India met Lt. Fred Johnston.

Captain Allen reports that while A. G. A. employees have been the only acquaintances he has seen, presence of Laboratories-developed A-11 oxygen regulators aboard planes have given him a touch of home when the going was rough. Supporting the Chinese in Burma with the 14th Air Force, these regulators supplied him with the breath of life on numerous occasions. Despite stories to the contrary, he says that chop sticks are handy when there is nothing else available.

Hodgdon and Willich are now both in France. Hodgdon is in the southern section after a leave in the states and active service in Italy with the artillery. Willich has heard from Lt. Carl Geltz, another Laboratories engineer, who is stationed in the same vicinity but they have not been able to meet as yet. Willich's unit has received the Presidential Unit Citation for action against the enemy.

In a recent letter, Hodgdon gives a glimpse of social life in France, describing his New Year's Eve. Previously he had met an English captain who introduced him to a French major. The major introduced him to his two daughters who speak French and Italian and whose grandfather was an American. Thus Hodgdon took an American-French girl whom he had met through an Englishman to a party and carried on a rather limited conversation in Italian. He finds feminine coiffeurs quite amazing—hair being worn in many colors from dead white to jet black, even purple and green appearing occasionally. Salmon pink and deep crimson along with many combinations of yellow, red and brown are popular.

Lt. Johnston and another former Laboratories engineer now overseas, Lt. Donald F. Leverett, in recent months have both announced the birth of heirs at home. Leverett is in the Air Corps and has seen a good bit of the world too, being an instructor in radar.

Latest Laboratories staff member to join the armed forces is Erwin H. Strassemeyer now taking boot training at Great Lakes, Illinois.

Lt. Frank E. Hodgdon

Captain C. G. Allen

Requirements for Gum Protective Devices

DISTRIBUTION has been made to manufacturers of certified gas appliances and accessories of new listing requirements covering gum protective devices for use on manufactured gas appliances.

These requirements were developed in recognition of the importance of the pilot outage problem. Following much study and research, it was found possible to formulate constructional and performance features with which devices for protection of constant burning pilots should comply. Exhaustive tests have demonstrated that accessories meeting the provisions established will afford effective protection against gum forming constituents and other material such as dust and dirt. The new requirements are now in the hands of the American Standards Association for adoption as American Standard. They become effective January 1, 1946.

In order to provide suitable pilot protection on appliances used for manufactured gas service, the decision has been reached that gum protective devices complying with the new standards shall be provided for constant burning pilots. This ruling is effective for all such appliances, with the exception of gas water heaters, on January 1, 1946. For water heaters it becomes effective one year later. Suitable revisions to approval standards to accomplish the purpose desired have been distributed to the industry.

New Burner Design Bulletin

PUBLICATION of the latest research bulletin of a series on technical factors affecting gas burner design has been completed by the American Gas Association Testing Laboratories and distribution made to the gas industry.

The new research bulletin, No. 34 "Temperature As a Factor in the Design of Aerated Gas Burners," is the eighth dealing specifically with burner research to be released under the supervision of the Association's Committee on Domestic Gas Research. Data presented are complementary to those given in preceding bulletins of the series. Together they further advance the technical foundation already established towards a scientific approach to the problem of burner design.

Characteristic flame limits are analyzed in terms of air-gas mixture temperatures within the burner head and effects of elevated temperatures on lifting, yellow tip, and flashback presented in detail. Formulas are devel-

oped for the calculation of flame inner cone height, applicable to natural, manufactured and butane gases.

A section of the new bulletin is devoted to discussion of further study of burners injecting all air necessary for combustion as primary air. Temperatures of air-gas mixtures normally encountered in aerated burners of numerous contemporary appliances are likewise presented.

Additions to Gas Valve Standards

NEW provisions for inclusion in American Standard Listing Requirements for Gas Valves have been printed and distributed to the industry for criticism. They consist mainly of additional dimensional and constructional features which apply to gas range valves. Generally accepted as representing best current practices, they have accordingly been designated as "standard" features and included in present listing requirements. While not mandatory, they are nevertheless highly recommended.

Originally proposed by manufacturers of gas valves in the interest of standardization, suggested additions were reviewed by the Subcommittee on Listing Requirements for Gas Valves at its recent meeting. With minor changes they were adopted for presentation to the industry for review and criticism. Prior to adoption of the requirements, all suggestions received will be given full committee consideration. Application of the new revisions should aid materially in promoting standardization of gas range valves.

To provide all branches of the industry with full opportunity for advance study and criticism of both new and modified requirements, a carefully worked out program has for several years been followed in their distribution and adoption. All such material is printed in distinctive form and cover, marked "For Criticism Only," and supplied to gas utility companies as well as gas appliance and accessory manufacturers. They are further supplied to members of all approval requirements groups.

Each printed copy is accompanied by a letter outlining the principal features involved and requesting that the text be thoroughly reviewed and suggestions forwarded promptly to the Chairman of the Approval Requirements Committee. Replies received are summarized and discussed in detail by the committee responsible for preparation of the material distributed. In this way valuable suggestions can be incorporated in the final requirements prior to their presentation to the Approval Requirements Committee for adoption. As a final step they are submitted to the American Standards Association for acceptance as American Standard.

Obituary

ROBERT HARE DELAFIELD, vice-president in charge of finance of the Columbia Gas and Electric Corporation, New York, N. Y., died at his home in Hewlett, L. I., on Feb. 11 after a ten-day illness. He was 51 years of age.

Mr. Delafield was born in San Francisco and educated at Promfret School and Harvard University. He began his business career with the Metropolitan Building Company in Seattle, moving to New York a year later to join the National City Bank. In 1916 he was transferred to the National City Company when that was formed and in January 1917 took charge of the sales organization for the New York area. Except for the interim when he served in the world war and attained the rank of Major, he continued with the National City Company until he joined Columbia. For five years, he was in charge of National City's Boston office.

Mr. Delafield became financial vice-president of Columbia Gas and Electric Corp. in 1931 when he was 37 years old.

DANIEL E. BYRNE, retired president of the Gas Appliance Co. of Brooklyn, died at his home in Summit, N. J., on February 15.

Born in Philadelphia, Mr. Byrne held the degree of doctor of chemistry, conferred by the University of Pennsylvania.

CHARLES W. SMYTHE, assistant general manager, gas department, Public Service Electric and Gas Company, Newark, N. J., died January 31. He was 55 and was born in Winfield, Kansas.

Mr. Smythe had been with Public Service, in the gas department, since 1912 and was made assistant general manager of that department in April of last year. For five years prior to that time he was general superintendent of gas manufacture. Earlier, he was, successively superintendent of the company's Front Street and Market Street gas works in Newark and its Trenton gas works. In 1924 he was promoted to assistant engineer of gas manufacture, Hudson Division, and two years later was made assistant general superintendent of gas manufacture.

He was graduated from Purdue University in 1910 and was with the Indiana Lighting Company for two years prior to entering the employ of Public Service.

JOE BRENNAN, vice-president of the Memphis Light, Gas and Water Division and former chairman of the Park Commission at Memphis, Tenn. died Feb. 19. His age was 61.

A lifelong resident of Memphis, Mr. Brennan had been active in many civic and humanitarian organizations. He began his business career as a meter reader in the early 1900's for the Merchants Power and Light Company. He continued with the company when it became the Memphis Light, Gas and Water Division.

ANDREW J. VOORHEES, assistant secretary of The Brooklyn Union Gas Co., died in January, at the age of 63. He had been ill for the past eight months.

Mr. Voorhees entered Brooklyn Union on December 12, 1910, as secretary to James H. Jourdan, then vice-president. He remained Mr. Jourdan's secretary when the latter became president and later chairman of the board. On March 10, 1938, he was elected assistant secretary of the company.

C. L. BRYANT, president-treasurer of the C. L. Bryant Heater Corporation, gas boiler and furnace manufacturer of Cleveland, Ohio, died January 29 after an illness of four weeks.

"C. L.," as he was known throughout the gas industry, was one of the early pioneers of house heating with gas. He founded The Bryant Heater Company when many of the automatic features of gas boilers and furnaces were unknown and developed boilers and furnaces for use with both natural and manufactured gas. Later he organized the Bee-Line Boiler Company and added many new features to make gas boilers more reliable and acceptable to home owners.

About fifteen years ago, he founded the C. L. Bryant Corporation and the Bryant Machine Products Company. As head of these two companies he specialized on further perfecting conversion gas burners and warm air and winter air conditioning equipment and, at the time of his death, was executing a number of important war production contracts for precision machined parts.

Mr. Bryant had been a member of the American Gas Association since 1929. He served on several committees which had to do with various phases of gas house heating and water heating and was a firm backer of the A. G. A. Laboratories from the time they were organized.

JOHN V. McKINNEY, 51, prominent utilities executive, president of the Iowa-Illinois Gas and Electric Company since its inception January 1, 1942, and a member of the board of directors of the United Light & Power Company and the Continental Gas & Electric Company, died January 27.

Prior to assuming his duties as president of the newly organized Iowa-Illinois early in 1942, Mr. McKinney had served as executive vice-president of the Kansas City Public Service Company since 1926, his employment with that company having extended over a period of seventeen years. He was also vice-president and director of the Wyandotte Railways Company from 1926 to 1942 and vice-president and director of the Yellow Cab Company of Kansas City from 1928 to 1933.

His wide and varied experience in the public utility field included service with the Milwaukee Railway and Light Company, Elston and Company, Northern Iowa Gas and Electric Company, and William G. Woolfolk and Company, consulting engineers of Chicago.

Personal and Otherwise

Bellamy Heads Industrial Gas Reserch

Charles R. Bellamy

CHARLES R. BELLAMY, chief engineer, gas department, Columbia Gas and Electric Corporation, and vice-president, Columbia Engineering Corp., has been appointed by J French Robinson, president, American Gas Association, to the chairmanship of the Committee on Industrial Gas Research, succeeding John W. Batten of Detroit.

Mr. Bellamy, who is a graduate of Lafayette College in Chemical Engineering, has been a member of the Industrial Research Committee for three years, and previously was chairman of the Joint Committee on Gas Summer Air Conditioning. He is a member of the American Institute of Chemical Engineers.

The Association's research in industrial and commercial gas utilization has been conducted on a moderate scale in recent years. Plans are now being made to greatly enlarge the work in anticipation of the period of reconversion of war production plants and of the postwar period, when the correct application of industrial and commercial gas will be of utmost importance.

Mr. Bellamy is eminently fitted to lead this important work for the industry. He has had extensive experience in directing research in various fields including industrial gas utilization. For twelve years he did engineering work for Semet-Solvey Company in different parts of the country. During the latter part of this period he was gas engineer for all Semet-Solvey plants.

As a private consulting engineer from 1923 to 1929 he specialized in gas manufacturing problems, coke oven design, and designed several of the largest benzol plants in the country. His list of clients reads like a "Who's Who" of American industry. His work with Columbia Gas & Electric began in 1929.

Serving with Mr. Bellamy on the Committee on Industrial Gas Research will be the following: Karl Emmerling, The East Ohio Gas Co., Cleveland, Ohio; John B. Frost, The Brooklyn Union Gas Co., Brooklyn, N. Y.; Charles C. Krausse, Consolidated Gas Electric Light & Power Co. of Baltimore, Baltimore, Md.; J. P. Leinroth, Public Service Electric & Gas Co., Newark, New Jersey; E. F. Schmidt, Lone Star Gas Co., Dallas, Texas; R. G. Taber, Atlanta Gas Light Co., Atlanta, Ga.; Eugene D. Milener, Secretary, American Gas Association, New York, N. Y.

Higley Takes New Post

EFFECTIVE February 28, 1945, Elmer K. Higley resigned as general auditor of Middle West Service Company to become controller of Public Service Company of Oklahoma, Tulsa.

Rodman McClanahan, vice-president and controller of United Public Utilities Corporation, Chicago, formerly associated with Middle West Service Company, has been elected to succeed Mr. Higley as general auditor of Middle West Service Company.

L. E. Nash, assistant to the general auditor of Middle West Service Company, will continue in that capacity and, in addition, will act as assistant to the controller, C. E. Packman.

Werner Named Jersey Central Head

EDWIN H. WERNER of Altoona, Pa., was elected president and a director of Jersey Central Power & Light Company at a meeting of the board of directors Feb. 21. Since 1941 he has been president and general manager of Pennsylvania Edison Company with headquarters at Altoona, Pa., from which position he has resigned. In his new position he succeeds the late Thomas R. Crumley.

Prior to his connection with Pennsylvania Edison Company, Mr. Werner was vice-president and general manager of New Jersey Power & Light Company from 1933 to 1936 and of Metropolitan Edison Company from 1933 to 1941. He was born in Wernersville, Pa. and received his engineering training at Pennsylvania State College.

E. E. Ellis Appointed To Engineering Post

IN order to perfect the organization of the engineering departments of the Southern California Gas Company, Los Angeles, E. E. Ellis has been named supervising engineer with jurisdiction over the civil and design engineering departments, reporting to B. M. Laulhere, manager of engineering services.

Maintenance of the company's offices at 810 and 820 South Flower Street and 27 commercial offices has also been placed under Mr. Laulhere's direction, and J. T. Cortelyou has been named building maintenance engineer under W. R. Shettel, construction engineer.

Earl Smith Heads Atlantic City Utility

ANNOUNCEMENT has been made of the election of Earl Smith as president of the Atlantic City Gas Company. He succeeds Robert W. Wiederwax who died December 6.

Mr. Smith started in the gas business in 1911 with the C. H. Geist Company at Lansing, Michigan. In March, 1920, he was transferred to Atlantic City as superintendent of manufacture.

When Public Service Corporation of New Jersey acquired control of the Company in July 1930, Mr. Smith continued as superintendent. In December 1941 he was promoted to general superintendent, which position he held at the time of his election as president.

On March 6, Mr. Smith will celebrate his twenty-fifth anniversary in the employ of Public Service and predecessor companies.

Mr. Smith received his education at Michigan State College.

Jersey Central Executive Appointments

THE board of directors of New Jersey Power & Light Company has announced, effective February 16, the election of William F. Moses as a vice-president in charge of customer and employee relations, Ralph N. Malehorn as comptroller, Paul M. Lenhart as secretary and assistant treasurer and Mrs. Eunice G. Ackerman as assistant secretary. Appointment of Norman L. Nelson as internal auditor has also been recently announced.

Dreiman Made Comptroller

Roy N. Dreiman

ROY N. DREIMAN, general auditor, assistant treasurer, and a director of the Coast Counties Gas and Electric Company, has been appointed comptroller of Pacific Public Service Company, Arrowhead and Puritas Waters, Inc., and the Coast Counties Gas and Electric Company, with headquarters in San Francisco, it was announced early in January by Ernest Lawson, president of Pacific Public Service Company.

Mr. Dreiman, born in Monroe City, Indiana, began his utility career in 1915. He went to California in 1928 as secretary-treasurer of the companies managed by the Standard Management and Operating Corporation. In 1932 he moved to Santa Cruz to his position with Coast Counties.

Mr. Dreiman has been active in civic and fraternal affairs.

Joseph F. Ehrlich (second from right) receiving a McCarter medal from H. H. Pigott, operating manager, Equitable Gas Co., for an outstanding act of life saving. J. R. Headley (left) won a McCarter certificate of assistance. At right is T. H. Kendall, chairman, Distribution Com.

Pittsburgh Employees Win McCarter Awards

JOSEPH F. EHRLICH of the Appliance Service Division of the Equitable Gas Co., Pittsburgh, recently received a McCarter medal and certificate for performing an outstanding act of life saving by application of the Schafer prone pressure method of resuscitation. Assisted by J. R. Headley of the same company, Mr. Ehrlich saved the life of a 15-year-old girl who had been overcome by gas from a faulty water heater. Mr. Headley was awarded the McCarter certificate of assistance for his part in the action.

Both men received $25 each from the company for their life-saving deed. Presentation of the awards was made by H. H. Pigott, operating manager.

The McCarter medal is awarded by the American Gas Association upon recommendation of the Accident Prevention Committee.

New Assignments for Smith and Fowler

H. C. FOWLER, formerly assistant chief of the petroleum and natural-gas division of U. S. Bureau of Mines, in Washington, has been transferred to Bartlesville, Okla., as supervising engineer of the bureau's petroleum experiment station there. N. A. C. Smith, for 19 years supervising engineer at the Bartlesville station, has been re-assigned, at his own request, to the post of special assistant to the supervising engineer.

In his new position Mr. Smith will handle specialized research and technical writing. Dr. R. B. Sayers, director of the bureau, paid tribute to Smith's administration of the Bartlesville section, which has been expanded and developed to an institution for petroleum research.

Mr. Smith, a graduate of Clark University, was engaged in industrial chemistry work for about 6 years before entering the petroleum and natural-gas division of the bureau in 1918. Mr. Fowler has been a member of the petroleum and natural-gas division for 21 years. Graduated from Stanford University, he was employed by California oil companies for several years before joining the bureau in 1923.

Public Service Gas Men Promoted

JOHN A. CLARK, vice-president in charge of gas operation, has announced the following promotions in the Gas Department of Public Service Electric and Gas Company, Newark, N. J.

Robert H. Philipps, Jr., from general superintendent of manufacture, to assistant general manager, succeeding Charles W. Smythe, who died in January.

William J. Harvey, from assistant general superintendent of manufacture, to general superintendent of manufacture.

J. Arthur Scheller, from engineer of manufacture, Essex Division, to assistant general superintendent of manufacture.

John V. Richards, from assistant engineer of manufacture, Essex Division, to engineer of manufacture, Essex Division.

On OPA Industry Advisory Committee

F. C. PACKER, assistant to the president of Payne Furnace Company, Beverly Hills, Calif., has been elected chairman of the industry advisory committee of the Office of Price Administration, representing manufacturers of gas-fired furnaces. Arthur Wrieden, general manager, Lennox Furnace Co., Syracuse, N. Y., has been named vice-president, and C. B. Kuhn, secretary and treasurer, Coleman Lamp and Stove Co., Wichita, Kan., was selected as secretary-treasurer.

Tappan Elects New Vice-Presidents

ELECTION of C. V. McConnell and A. B. Ritzenthaler to fill newly created posts as vice-presidents and the promotion of Keith B. Miller to sales manager, has been announced by Paul R. Tappan, president of the Tappan Stove Company.

Mr. McConnell, who has served as sales manager since 1928, will be in charge of merchandising and sales promotion, while Mr. Ritzenthaler, former eastern district manager, with headquarters in New York City, and more recently war products manager at Mansfield, Ohio, will have supervision over Tappan salesmen.

Former assistant sales manager under Mr. McConnell, Mr. Miller, who joined the firm in 1922, will execute his duties as sales manager.

This election brings to three, the number of Tappan vice-presidents. The other is W. Hubert Tappan, first vice-president.

Lone Star Changes

MANAGERIAL changes in the Ennis, Temple and Terrell districts of Lone Star Gas Company, Texas, were announced by L. B. Denning Jr., operating manager for the general division of distribution. The appointments were effective January 16.

H. L. St. John has been transferred to the Ennis district as manager and has been replaced as Temple district manager by George F. Peck, Jr. B. B. Stringfellow has been appointed manager of the Terrell district, succeeding Mr. Peck. H. C. Davis, manager of the Ennis district, has been named supervisor of postwar sales programs in the Abilene division.

Joins Industrial Engineering Firm

C. B. Mershon

OSCAR R. OLSEN, president of the Pennsylvania Industrial Engineers, which specializes in gas-burning equipment and all types of metallurgical furnaces, has announced that Carroll B. Mershon has been appointed assistant to the president of the company. The offices of the company are in the Fulton Building, Pittsburgh, Pennsylvania.

A graduate of Iowa State College Mr. Mershon has been with the Manufacturers Light and Heat Company at Pittsburgh since 1930, first as industrial engineer, and since January 1940 as manager of Industrial Sales.

For a number of years, he was a member of the Managing Committee of the A. G. A. Industrial and Commercial Gas Section.

Cities Service Elects Watson Vice-President

BURL S. WATSON has been elected a vice-president of Cities Service Co., W. Alton Jones, president, announced February 22. Mr. Watson heretofore was a director of the company and has been connected with the concern or its subsidiaries since 1917. He is also director and officer of a number of petroleum, natural gas and electric subsidiaries and is in charge of Cities Service realty holdings in lower Manhattan.

Erle G. Christian, controller, was appointed secretary of the company, and Chester E. Weger will succeed him as controller. Ernest H. Johnston was elected treasurer. He has been with the organization for thirty-eight years and a director since 1916.

Brockschmidt Joins Standard Oil of N. Y.

C. L. Brockschmidt

EFFECTIVE Mar. 1, 1945, C. L. Brockschmidt will join the staff of the Standard Oil Company of New Jersey as gas engineer in foreign marketing coordination, with an office in New York City.

Since March 1942, Mr. Brockschmidt has been connected with the War Production Board as natural gas engineer, being one of the first to be employed from the natural gas industry in the old Power Branch, which later became the Power Division and is now the Gas Division of the Office of War Utilities. For the past 18 months, he has been chief of the Supply and Allocation Section, Natural Gas Division.

From 1931 to 1942, he was combustion engineer for the Mississippi River Fuel Corp., St. Louis, and before that spent four years as industrial gas sales engineer with the Lone Star Gas Company, Dallas, Texas.

Gas Institute Appointments

MORRIS FISHER and Dr. Sidney Katz have been added to the technical staff of the Institute of Gas Technology, Chicago, it has been announced by John I. Yellott, director.

Mr. Fisher, a specialist in micromeritics, the science of small particles, has been assigned to work on an improved method of producing carbon black, a paint pigment. He was a chemist for eight years with the U. S. Bureau of Mines at Pittsburgh, and during the last year has done research on a special project at Columbia University, New York City. He holds the bachelor and master of science degrees from Carnegie Institute of Technology, Pittsburgh, where he also taught chemistry.

Dr. Katz will work in the field of gas chemistry, particularly in the physical chemistry of fundamental gasification reactions. His first assignment is a special project for the National Research council.

Formerly research chemist for Goldsmith Brothers, Chicago, and for the Pfaustiehl Chemical Company, Waukegan, Dr. Katz has served for two years as lecturer in mathematics at Illinois Institute of Technology. He received his Ph.D. at McGill University.

Miller Resigns

BENJAMIN MILLER has resigned as technical assistant to the director of the Institute of Gas Technology, effective April 30, 1945, to engage in independent consulting practice in New York. He will continue to serve the institute as a consultant.

Coast Counties Officers Named

E. G. LAWSON, chairman of the board of directors of the Coast Counties Gas and Electric Company, has announced the following changes made at the board's meeting on Monday, February 5:

A. E. Strong and Charles Grunsky of Santa Cruz, and Lt. Col. A. R. Bailey of San Francisco (now serving in France) were elected directors to succeed J. H. MacGaregill, J. L. Hanna and B. W. Letcher, resigned.

R. N. Dreiman of San Francisco was elected a vice-president, in addition to his posts as comptroller and a director.

J. K. Horton of San Francisco was elected secretary and assistant treasurer, succeeding B. W. Letcher, resigned.

H. D. Armstrong of San Francisco was elected treasurer, succeeding H. C. Judd, resigned.

John E. Wolfe of San Francisco was elected assistant secretary.

Sales Promotion Manager In Portland, Ore.

Fred M. Kimball

FRED M. KIMBALL, until recently with the War Production Board in Washington, D. C., as chief of the allocation section of the manufactured gas division, office of war utilities, has been named sales promotion manager of Portland (Ore.) Gas & Coke Company.

His major responsibilities will be the direction and analysis of postwar marketing surveys and studies which the Portland utility is conducting in the commercial, industrial and residential fields, said R. G. Barnett, vice-president and general manager, in making the announcement.

Independent Natural Gas Office in Washington

John A. Ferguson

WASHINGTON offices of the Independent Natural Gas Association of America were opened in February, E. Buddrus, president, announced. The new offices, located in Suite 305 at 1700 I Street, N. W., will operate under the direction of John A. Ferguson, executive director.

The association will continue to maintain its Mid-Continent offices in Oklahoma City, Oklahoma.

Mr. Ferguson is a member of the Missouri Bar, formerly engaged in law practice in the firm of Ellis-Rozier and Ferguson. From 1933-1935 he served as special deputy commissioner of finance for the State of Missouri. Appointed to membership on the Missouri Public Service Commission in July, 1936, he served continuously until his recent resignation to accept his new post.

Stang Appointed

JOHN H. STANG, mechanical engineer, has been appointed to the staff of Battelle Institute, Columbus, Ohio, and assigned to its division of fuels research.

A graduate of the Ohio State University, he was formerly an assistant in the Department of Mechanical Engineering of that school. He is a member of the American Society of Mechanical Engineers, the Society of Automotive Engineers, and Tau Beta Pi, honorary engineering society.

Meter Reading Champ

CHARLES V. DILLON, The Brooklyn Union Gas Company's national champion no-error meter reader, has completed his 15th consecutive year without an error being recorded against him. In that time he has taken 889,536 readings.

So far as can be learned, Mr. Dillon's achievement is without a parallel anywhere in the world.

Shepard at St. Petersburg

APPOINTMENT of Daniel B. Shepard as assistant superintendent at the city gas plant, St. Petersburg, Fla., has been announced by City Manager Carleton F. Sharpe. The appointment is temporary but it is expected that he will be named superintendent when John W. Perkerson retires, after 28 years of service with the city. Mr. Shepard will qualify under civil service.

Mr. Shepard left Newport News, Va., where he has been gas plant superintendent in that city for the past 12 years to take his new post.

FUNCTIONAL ACCOUNTING

(Continued from page 132)

is segregated. Some companies operate in a few towns, while others have a hundred or more. Some companies want budget estimates with which to compare their expenses. It could necessitate a complete set of instructions for the field or organization.

In setting up any method of functional accounting it is necessary first to have the accounting methods man determine a probable outline, then to have a meeting within the managerial group involved together with the department heads, to discuss in detail this outline. You must mutually agree on what you want to control and determine the simplest possible classification of functions to attain this. Functional classification can be of value only if all the persons responsible for the control of costs understand them and have a part in the system's development.

Even under the most detailed system of functional accounting it may be desirable, in some instances, that a work order system supplement the functional classification. This becomes necessary, perhaps, only when there are numerous charges within the same function controlled by two or more individuals. This is real detail and is not recommended, except where the required answers cannot be obtained by assigning functional classifications.

Summary

Functions, are after all, a matter of expediency and opinion. I deem it advisable, however, to call your attention to an important fact—that is in preparing a list of functions, generally you should not include under a function, activities which are chargeable to more than one account in the uniform classification. Where an activity is of a joint nature and covers more than one account, it is desirable that the distribution of the function to the prescribed accounts in the classification be made arbitrarily by the general accounting department at the end of a prescribed period. The general accounting department has the responsibility of fitting the various functions into the proper accounts of the classification, in order that reports may be made to the regulatory bodies.

Functional accounting in its detailed form may not be practicable for many small companies. Because of the close contact between operators and the working force, the need for such detail does not exist. Neither, however, is the detailed classification of accounts required for efficient operation in such cases; the system as described for The Connecticut Light and Power Company is more adaptable to the needs of the small company. In fact, The Connecticut Light and Power Company, as noted above, operating in fourteen districts, may be represented as fourteen small companies; each district is headed by a manager who is entirely responsible for its operation to top management. Small companies in most instances are enabled to adopt the principles of functional accounting, but should not necessarily adopt the detailed procedures.

Functional accounting, like accounting itself, is not an exact science—it is a matter of judgment. There are no specific rules for its adoption. It will not answer all the questions pertaining to expenses, but it will answer most of them. Detailed analyses of expenses or operations for particular purposes will always be needed. You may like the detailed system of functional accounting, or you may prefer the simple set-up described for The Connecticut Light and Power Company. It has been used for a number of years, and gives, as far as that management is concerned, all the necessary information for control purposes.

SCIENCE IN NATURAL GAS

(Continued from page 106)

plode. It has not been known to enter into any chemical reaction and in that it is the lightest gas known, excepting hydrogen, its scientific applications have become of invaluable help to humanity.

Whether ascending to record heights in the stratosphere balloon or descending to the greatest depths of the sea ever visited by man, these operations find the use of helium unique. Today helium is used to inflate blimps used in anti-submarine patrol, fill barrage and meteorologic balloons, make diving and caisson operations less dangerous, relieve human suffering, enable war industries to weld magnesium and other metals for airplane construction, and aid war activities in many ways. Tomorrow its use in promoting science, industry, transportation, and medical treatment will only be limited by the scientists' ability to effect its maximum value.

It is true that the quantity of petroleum and its products concealed within the earth is of a definite magnitude and that it is not being replaced as produced; thus, the scientists' activity is necessary and of value in securing a maximum recovery and efficient use of this natural resource during its productive period. As we draw near the end of our world petroleum resources, which does not appear imminent in our normal span of life, we are assured not only of constantly improving products but also of satisfactory substitutes produced from our enormous stores of other natural material resources—all to be realized through the technologists' accomplishment of the scientists' dream. We have definite assurance of such things to come, witnessed by the amazing progress during the present emergency, through science in natural gas.

Personnel Service

SERVICES OFFERED

Manager with broad training and experience in the operation and management of gas properties, well grounded in the manufacture of carburetted water gas and both high and low pressure distribution. Experience also includes sales and commercial activities. College graduate with technical degree. **1486.**

General Superintendent or **Manager** of medium sized gas property preferably in the south. Experience consists of 15 years' plant operation and 8 years as general manager with a record of low operating costs and resulting satisfactory net earnings. **1488.**

Utility **Engineer-Executive**; with wide experience in construction, operation, purchasing, sales and management in natural and manufactured gas, electric and water utilities; with excellent educational background; wishes to make change. Progressive with good record for results. **1489.**

POSITIONS OPEN

Ohio company supplying natural gas has position for man familiar with **orifice metering** and the maintenance and construction of high pressure lines. Engineering training desirable, but not necessary. **0409.**

Home Economist wanted by Pittsburgh district gas utility. Must have 5 to 10 years' experience, at least partially in utilities field. Must be capable of conducting cooking schools and demonstrations and have some experience in writing food and home economics articles for publication. Write full information as to training and experience. **0410.**

Wanted experienced **Home Economist** to take charge of Home Service Department for combination gas and electric company operating in Montana, North and South Dakota and Wyoming. Would make headquarters at Bismarck, N. D. Must be capable of conducting cooking schools and selecting and training home service girls. Send full information as to training and experience. **0408.**

KEEP YOUR RECORD UP TO DATE

Confidential Classification Records are being reviewed to confirm availability and to check addresses.

A privilege of membership is three continuous insertions of a 50-word "Services Offered" advertisement for insertion in the American Gas Association Monthly. Copy should be received not later than the 8th of the month immediately preceding publication. During the emergency, non-members may submit copy for at least one insertion; every advertisement must be supported by a Confidential Classification Record.

"Positions Open" copy may be longer and can frequently be received up to the 20th of the month preceding publication.

For Service Men and Women

Men and women now in the armed forces of the nation (or who have been discharged therefrom) and who are anticipating return to the industry will be appropriately designated by a star.★

There is no charge for any of the Personnel Service advertisements.

ADVISORY COUNCIL

BURT R. BAY.....Omaha, Neb.
E. J. BOYER .....Minneapolis, Minn.
LYMAN L. DYER.....Dallas, Texas
HARRY L. GAIDRY.....New Orleans, La.
B. H. GARDNER.....Columbus, Ohio
GEORGE S. HAWLEY.....Bridgeport, Conn.
W. ALTON JONES.....New York, N. Y.
MALCOLM LEACH .....Taunton, Mass.
J. L. LLEWELLYN.....Brooklyn, N. Y.
H. N. MALLON.....Bradford, Pa.
L. A. MAYO.....Hartford, Conn.
GEORGE F. B. OWENS.....Brooklyn, N. Y.
O. H. RITENOUR.....Washington, D. C.
JOHN A. ROBERTSHAW.....Youngwood, Pa.
W. F. ROCKWELL.....Pittsburgh, Pa.
B. A. SEIPLE.....Asbury Park, N. J.
C. V. SORENSON.....Hammond, Ind.
MARCY L. SPERRY.....Washington, D. C.
R. E. WERTZ.....Amarillo, Texas
CHARLES G. YOUNG.....Springfield, Mass.

AFFILIATED ASSOCIATIONS

Association of Gas Appliance and Equipment Manufacturers
Pres.—Lyle C. Harvey, Bryant Heater Co., Cleveland, Ohio
Man. Dir.—H. Leigh Whitelaw, 60 East 42nd St., New York, N. Y.

Canadian Gas Association
Pres.—Alan H. Harris, Jr., Winnipeg Electric Co., Winnipeg, Manitoba
Exec. Sec.-Tr.—George W. Allen, 7 Astley Ave., Toronto.

Gas Meters Association of Florida-Georgia
Pres.—W. Bond Collins, Peoples Water and Gas Co., Miami Beach, Fla.
Sec.-Tr.—B. G. Duncan, Florida Power Corp., Orlando, Fla.

Illinois Public Utilities Association
Pres.—C. W. Organ, Central Illinois Light Co., Springfield, Ill.
Sec.-Tr.—T. A. Schlink, Central Illinois Light Co., Springfield, Ill.

Indiana Gas Association
Pres.—Clarence W. Goris, Northern Indiana Public Service Co., Gary, Ind.
Sec.-Tr.—Paul A. McLeod, Public Service Co. of Indiana, Inc., 816 Traction Terminal Building, Indianapolis 9, Ind.

Michigan Gas Association
Pres.—Henry Fink, Michigan Consolidated Gas Co., Detroit, Mich.
Sec.-Tr.—A. G. Schroeder, Michigan Consolidated Gas Co., Grand Rapids, Mich.

Maryland Utilities Association
Pres.—William B. Bennett, Capital Transit Co., Washington, D. C.
Sec.—Raymond C. Brehaut, Washington Gas Light Co., Washington, D. C.

Mid-Southeastern Gas Association
Pres.—J. S. Rider, Consolidated Utilities Corp., Sumter, S. C.
Sec.-Treas.—Edward W. Ruggles, North Carolina State College, Raleigh, N. C.

Mid-West Gas Association
Pres.—C. A. Bland, Iowa Power and Light Co., Des Moines, Iowa
Sec.-Tr.—Roy B. Searing, Sioux City Gas & Electric Co., Sioux City, Iowa.

Missouri Association of Public Utilities
Pres.—C. A. Semrad, St. Joseph Railway, Light, Heat and Power Co., St. Joseph, Mo.
Sec.-Tr.—N. R. Beagle, Missouri Power & Light Co., Jefferson City, Mo.
Asst. Sec.—Jesse Blythe, 103 West High St., Jefferson City, Mo.

Natural Gas and Petroleum Association of Canada
Pres.—Major E. Sweet, Brantford, Ont.
Sec.-Tr.—S. A. Morse, Union Gas Co. of Canada, Ltd., Chatham, Ont.

New Jersey Gas Association
Pres.—Frank H. Darlington, Peoples Gas Co., Glassboro, N. J.
Sec.-Tr.—H. A. Sutton, Public Service Electric and Gas Co., Newark, N. J.

Ohio Gas and Oil Association
Pres.—Earl F. Shadrach, Canton, Ohio
Sec.-Tr.—Frank B. Maullar, 811 First National Bank Bldg., Columbus, Ohio.

Oklahoma Utilities Association
Pres.—D. S. Kennedy, Oklahoma Gas and Electric Co., Oklahoma City, Okla.
Sec.—Kate A. Niblack, 625 Biltmore Hotel, Oklahoma City, Okla.

Pacific Coast Gas Association
Pres.—O. R. Doerr, Pacific Gas and Electric Co., San Francisco, Calif.
Man. Dir.—Clifford Johnstone, 447 Sutter St., San Francisco, Calif.

Pennsylvania Gas Association
Pres.—Charles K. Steinmetz, Pennsylvania Power & Light Co., Carlisle, Pa.
Sec.—William Naile, Lebanon Valley Gas Co., Lebanon, Pa.

Pennsylvania Natural Gas Men's Association
Pres.—Dan S. Keenan, Carnegie Natural Gas Co., Pittsburgh, Pa.
Exec. Sec.—Mark Shields, 2619 Grant Bldg., Pittsburgh, Pa.

Southern Gas Association
Pres.—Frank S. Kelly, Jr., Arkansas Louisiana Gas Co., Shreveport, La.
Sec.-Tr.—L. L. Baxter, Arkansas Western Gas Co., Fayetteville, Ark.

Wisconsin Utilities Association
Pres.—S. B. Sherman, Wisconsin Gas & Electric Co., Racine, Wis.
Exec.-Sec.—A. F. Herwig, 135 West Wells St., Milwaukee, Wis.

AMERICAN GAS ASSOCIATION

HEADQUARTERS, 420 LEXINGTON AVE., NEW YORK 17, N. Y.

OFFICERS AND DIRECTORS

President	J FRENCH ROBINSON	Cleveland, Ohio
First Vice-President	E. J. BOOTHBY	Washington, D. C.
Second Vice-President	R. H. HARGROVE	Shreveport, La.
Treasurer	EDWARD F. BARRETT	Mineola, N. Y.
Managing Director	ALEXANDER FORWARD	New York, N. Y.
Assistant Managing Director	J. W. WEST, JR.	New York, N. Y.
Assistant Managing Director	GEORGE H. SMITH	New York, N. Y.
Secretary	KURWIN R. BOYES	New York, N. Y.
Director, Publicity-Advg.	C. W. PERSON	New York, N. Y.
Sectional Vice-Pres.	C. E. PACKMAN	Chicago, Ill.
Sectional Vice-Pres.	HARRY K. WRENCH	Minneapolis, Minn.
Sectional Vice-Pres.	FRANK J. HOENIGMANN	Chicago, Ill.
Sectional Vice-Pres.	J. H. WARDEN	Tulsa, Okla.
Sectional Vice-Pres.	L. E. KNOWLTON	Providence, R. I.

ERNEST R. ACKER	Poughkeepsie, N. Y.	D. A. HULCY	Dallas, Texas
F. M. BANKS	Los Angeles, Calif.	NORTON McKEAN	Albany, N. Y.
R. G. BARNETT	Portland, Ore.	E. P. NOPPEL	New York, N. Y.
JOHN W. BATTEN	Detroit, Mich.	BRUNO RAHN	Milwaukee, Wis.
WALTER C. BECKJORD	New York, N. Y.	HUDSON W. REED	Philadelphia, Pa.
ARTHUR F. BRIDGE	Los Angeles, Calif.	HERMAN RUSSELL	Rochester, N. Y.
JAMES A. BROWN	New York, N. Y.	LOUIS RUTHENBURG	Evansville, Ind.
CHARLES M. COHN	Baltimore, Md.	T. J. STRICKLER	Kansas City, Mo.
N. R. FELTES	LaPorte, Ind.	E. J. TUCKER	Toronto, Ontario
RALPH L. FLETCHER	Providence, R. I.	H. CARL WOLF	Atlanta, Ga.
D. W. HARRIS	Shreveport, La.	P. S. YOUNG	Newark, N. J.
LYLE C. HARVEY	Cleveland, Ohio		

DEPARTMENT OFFICERS

MANUFACTURED GAS DEPARTMENT

Chairman	E. J. BOOTHBY	Washington, D. C.
Secretary	A. GORDON KING	New York, N. Y.

NATURAL GAS DEPARTMENT

Chairman	R. H. HARGROVE	Shreveport, La.
Director	GEORGE H. SMITH	New York, N. Y.

SECTION OFFICERS

ACCOUNTING—Chairman	C. E. PACKMAN	Chicago, Ill.
Vice-Chairman	E. F. EMBREE	New Haven, Conn.
Secretary	O. W. BREWER	New York, N. Y.
INDUSTRIAL AND COMMERCIAL GAS—Chairman	HARRY K. WRENCH	Minneapolis, Minn.
Vice-Chairman	HARRY A. SUTTON	Newark, N. J.
Secretary	EUGENE D. MILENER	New York, N. Y.
MANUFACTURERS—Chairman	FRANK J. HOENIGMANN	Chicago, Ill.
RESIDENTIAL GAS—Chairman	J. H. WARDEN	Tulsa, Okla.
Vice-Chairman	J. J. QUINN	Boston, Mass.
Secretary	F. W. WILLIAMS	New York, N. Y.
TECHNICAL—Chairman	L. E. KNOWLTON	Providence, R. I.
Vice-Chairman	LESTER J. ECK	Minneapolis, Minn.
Secretary	A. GORDON KING	New York, N. Y.
PUBLICITY AND ADVERTISING COMMITTEE—Chairman	C. A. TATTERSALL	New York, N. Y.

A. G. A. TESTING LABORATORIES—1032 East 62nd Street, Cleveland 14, Ohio
1425 Grande Vista Avenue, Los Angeles, Calif.

Chairman, Managing Committee	GEORGE E. WHITWELL	Philadelphia, Pa.
Director	R. M. CONNER	Cleveland, Ohio
Supervisor, Pacific Coast Branch	W. H. VOGAN	Los Angeles, Calif.

WASHINGTON OFFICE:
George W. Bean, Fuel Consultant, Albee Bldg., Washington 5, D. C.

PRINTED IN U. S. A.